

**INTERTIDAL SEDIMENT DATA SUMMARY REPORT AND SLERA
RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE
FORMER UNITED SHOE MACHINERY (USM) FACILITY
BEVERLY, MASSACHUSETTS**



by Haley & Aldrich, Inc.
Boston, Massachusetts

for The Stop & Shop Supermarket Company, LLC
Boston, Massachusetts

File No. 37713-051
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18 April 2018
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The Stop & Shop Supermarket Company, LLC
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Attention: Ronald W. Ruth

Subject: Draft Intertidal Sediment Data Summary Report and
Screening Level Ecological Risk Assessment (SLERA)
Retail Development – South Parcel Shoreline
Former United Shoe Machinery (USM) Facility
Beverly, Massachusetts
USEPA ID No. MAD043415991

Ladies and Gentlemen:

We are pleased to submit this Draft Data Summary Report and Screening Level Ecological Risk Assessment (SLERA) presenting results of field investigations and ecological risk assessment conducted for the Bass River intertidal area adjacent to the Retail Development – South Parcel of the Former United Shoe Machinery (USM) Facility in Beverly, Massachusetts (Site). Site locus and layout are shown on Figures 1 and 2, respectively.

This report describes sediment and surface water sample collection and analysis conducted during October 2017 pursuant to the “Quality Assurance Project Plan” (QAPP) for the above referenced Site, dated 25 August 2016 and approved by EPA on 29 August 2016, and interpretation of that data using a Screening Level Ecological Risk Assessment (SLERA). The SLERA utilized USEPA risk assessment methodology to evaluate potential “Worst-Case” environmental hazards from the Site and concluded that a condition of “No Significant Risk” to aquatic biota (invertebrates, fish and wildlife) exists. This conclusion was based on the following lines-of-evidence:

- Statistical comparison demonstrated no significant differences between levels of individual metals in sediments from the Site Area and Reference Area.
- Level of metals measured in apparent slag materials from the shoreline were considerably lower than metals in sediments.
- Parallel regression slopes of metals in sediment from the Site Area and the Reference Area indicate that metals in sediment are not derived from the apparent slag in fill materials along the shoreline.

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- Evaluation of bioavailability showed that metals in porewater would be tightly bound by sulfides which would eliminate exposure and subsequent ecological risk.
- Incremental risk from inadvertent exposure of higher trophic levels (e.g. marine birds or mammals) to sediments would be the same for both the Site Area and Reference Area and therefore, risk assessment using a simplified ecological food chain model is not required.

We trust that these findings will lead toward compliance with RCRA 2020 Corrective Action Requirements and Achievement of Interim Goals for the Site (EPA ID No. MAD043415991). Please do not hesitate to contact us should you have questions or require further information.

Sincerely yours,
HALEY & ALDRICH, INC.

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1. Introduction and Background

The South Parcel of the former United Shoe Manufacturing (USM) facility is located at 131 Elliott Street (Route 62), approximately 0.2 miles west of the central business district of Beverly, Massachusetts (Figure 1). The focus of this Intertidal Sediment Data Summary Report and Screening Level Ecological Risk Assessment (SLERA) is to evaluate if metals in apparent historic slag materials that were observed along the shoreline of the Retail Development - South Parcel may pose a risk to marine wildlife. Work was conducted in continued response to a 15 December 2010 letter from the Environmental Protection Agency (EPA) regarding RCRA Corrective Action Requirements and Achievement of Interim Goals for the subject site (EPA ID No. MAD043415991) and pursuant to the "Quality Assurance Project Plan" (QAPP) for the above referenced Site, dated 25 August 2016 and approved by EPA on 29 August 2016.

A significant amount of information on site history, geologic conditions, and analytical data, developed in the late 1980s and early 1990s, were presented in the MCP Phase II – Comprehensive Site Assessment and Phase III – Final Remedial Response Plan prepared by Haley & Aldrich. Excerpts of this information were included in the previous QAPP Data Summary Report, Retail Development – South Parcel, Former United Shoe Machinery (USM) Facility, Beverly, Massachusetts, dated 31 May 2012, prepared by Haley & Aldrich. Of relevance is the reported "slag" layer and the ubiquitous presence of cinder fill within the South Parcel. It is possible the reported "slag" may consist of "clinkers" from historical burning of coal which may provide designation as background or regulatory exemptions. Historical information shows that much of the area in question consists of filled land placed during the early 20th century for construction of the USM South Parcel.

The purpose of this document is to present the evaluation of the potential for ecological risks to be present in sediments adjacent to the Retail Development - South Parcel shoreline ("Site Area"). Traditionally, Ecological Risk Assessments (ERAs) are prepared in phases (Scoping, Screening, and Baseline) which were designed to progressively evaluate risk to ecological receptors at sites in accordance with guidance developed and recommended by the EPA (1997, 1998). The three phases of the ERA generally include:

- Scoping: The objective of a scoping phase of an ERA is to determine whether an important ecological resource is present in the locality of the site, and if so, to characterize exposures to site-related stressor(s) that may be present at a site. The EPA defined a stressor as a physical, chemical, and/or biological vector that has the potential to adversely affect the ecosystem at a site. The scoping phase of an ERA is intended to focus the assessment on observed habitat and preliminary monitoring data that may exist to allow for identification of likely stressors at a site. For this Site, field reconnaissance was conducted in the spring of 2013 by Dr. Stephen Clough, Haley & Aldrich Environmental Toxicologist, and a RCRA Corrective Action Ecological Receptor Exposure Pathway Scoping Checklist was subsequently submitted to USEPA Region I, on 30 October 2013. The checklist identified surface water and sediment as media of concern. Benthic invertebrates, fish and wetland-dependent wildlife were identified as receptors of interest
- Screening: If the results of the scoping phase indicate an important ecological pathway is present and potential environmental stressors may affect the environment, the next phase of the ERA is a Screening-Level Ecological Risk Assessment (SLERA). A SLERA compares conservative estimates of potential exposure (e.g. maximum values) to conservative effects

benchmarks (generally published criteria) to determine whether toxicologically significant exposures could occur. The results of the SLERA are used to make preliminary conclusions about ecological risk at a site.

- Baseline: If the SLERA identifies an unacceptable risk using conservative benchmarks, a Baseline Ecological Risk Assessment (BERA) is then necessary to further evaluate ecological risk. A BERA uses more realistic assumptions about exposure and effects to estimate risks associated with constituents of potential ecological concern (COPECs) that were retained during the completion of the SLERA. The conservative measures of exposure and effects that were used in the SLERA would be replaced during the BERA with more realistic exposure scenarios and include the use of site-specific data. The BERA generally includes refinements to the risk assessment process and may include a more detailed evaluation of site-specific bioaccumulation/bioavailability, performing toxicity tests to determine thresholds of site media, and/or performing biological surveys to complement the toxicity data.

This SLERA was developed to meet EPA Region 1 guidance for completing the “Environmental Indicator Determination” under the RCRA 2020 Corrective Action Program. Currently, there are no formal guidelines for evaluating risk to non-human (ecological) receptors. The “scoping” phase of the risk assessment for this study has been completed using the “RCRA Corrective Action Scoping Ecological Risk Assessment Checklist” (EcoChecklist) that was developed in conjunction with the EPA. This EcoChecklist identified surface water and sediment adjacent to the South Parcel as the primary media of concern. Based on the EcoChecklist, ecological receptors at the Site are likely aquatic organisms, which may include both benthic invertebrates and fish. Potential risks to terrestrial organisms need not be addressed since terrestrial habitat is limited and any existing habitat would be categorized as “disturbed” since the site is in an urban setting.

In 2012, a SLERA was performed (Geosphere, 2012) for the North Parcel ponds, known as Lower Shoe Pond and Upper Shoe Pond in response to EPA 2020 requirements for that property owner. These ponds are relevant as they are immediately upstream of the Bass River and South Parcel Site Area. The Lower Shoe Pond receives stormwater from a large portion of the city known as the North Beverly Brook Drainage Basin and stormwater runoff from the North Parcel. The Lower Shoe Pond discharges into the Bass River via a covered channel beneath Elliott Street.

The Geosphere SLERA evaluated data from six surface water and sediment samples (3 in each of the Upper and Lower Shoe Ponds). Each sample was analyzed for metals, acid-volatile sulfide/simultaneously extracted metals (AVS/SEM), volatile organic compounds, polycyclic aromatic hydrocarbons (PAHs) and total organic carbon (TOC). Surface water and sediment were compared to conservative ambient water quality criteria and sediment quality benchmarks, respectively. Conclusions of the SLERA indicated that surface water did not require further evaluation and that sediment posed a negligible ecological risk. EPA concluded that further investigation was required to address ecological receptor and exposure pathway information and site/background characterization, although the Geosphere, 2012 information is included for reference.

2. Site Investigation Program

2.1 OBJECTIVES

The objective of the Quality Assurance Project Plan (QAPP) was to determine the nature and extent of potential compounds of concern (metals) in the sediments located adjacent to the property (below the mean high-water mark but above the mean low water mark of the Bass River tidal inlet), in order to better inform the ecological assessment of the intertidal sediments.

The results of the Site analytical data were incorporated in a Screening Level Ecological Risk Assessment (SLERA) and compared to conservative ecological risk-based screening levels and/or site-specific background levels to select Constituents of Potential Concern (COPCs), and to safe risk-based benchmarks derived by USEPA (2005).

Activities described in this report were performed in general accordance with the QAPP. Deviations from the QAPP are described in Section 2.4.

2.2 SEDIMENT AND SURFACE WATER CHARACTERIZATION

The intertidal sediment and surface water characterization conducted at the Former USM Facility Retail Portion – South Parcel shoreline was conducted in one field mobilization during 26 to 27 October 2017. The program is described below.

2.2.1 Exploration Locations

Sediment samples were collected below the bank of the Bass River within the intertidal zone between the mean high water and mean low water boundaries, along transects that run perpendicular to the shoreline located in three separate areas at or adjacent to the site. Figure 2 presents a plan of the subject site and sampling locations. Sediment and surface water explorations were conducted by Haley & Aldrich field staff. As shown on Figure 2, sampling areas included:

- Site: along five transects (Site Transects S1 through S5) adjoining the site
- Boat Yard: along one transect (Boat Transect S1) adjoining the Bass Haven Yacht Club property
- Reference: along four transects (Reference Transects R1 though R4) located on the opposite side of the Bass River as a reference location

Surface water samples were collected at six (6) locations within Bass River providing representative coverage in the vicinity of the sediment transects areas, at or adjacent to the site. A surface water sample was collected from each of three transects located immediately adjacent to the site (S500, S400, S300, S200), and one sample was collected from each from upstream and downstream areas of the site area at sampling locations near the shore (S100 and BS10). Surface water sample locations were conducted along the perpendicular sediment sampling transects discussed above, between the "A" and "B" sediment sample locations on each transect.

2.2.2 Sediment Investigation

A total of twenty-two (22) sediment samples were collected as follows:

- 12 adjacent to the Site (from five transects – Site Transects S1 through S5),
- 2 adjoining the Bass Haven Yacht Club (from one transect – Boat Transect S1), and
- 8 samples located along the opposite (southern) shoreline of the Bass River as a reference location (from four transects – Reference Transects R1 though R4).

Sediment samples were collected by hand sampling using either a Lexan tube core sampler or a hand trowel, at a depth interval of 0 to 0.5 ft bss (below sediment surface). Each individual sample was a composite of two cores which were placed into a disposable pan and mixed to homogeneity to achieve a sample that is representative of the 0 to 0.5 ft sediment depth interval. A representative subsample of this composited material was placed into the appropriate laboratory sampling containers for the analyses to be conducted.

Field QC samples included collection and analysis of two field duplicate samples, and MS/MSD sample analysis was conducted on one of the soil samples collected. Field notes of the sediment explorations prepared by Haley & Aldrich are provided in Appendix A.

2.2.3 Surface Water Investigation

A total of six (6) surface water samples were collected from six (6) locations within Bass River providing representative coverage in the vicinity of the sediment transects - one sample from Boat Transect S1, and one sample each from Site Transects S1 through S5. Refer to Figure 2 showing a plan of the subject site and proposed sampling locations.

Surface water samples were collected by manually placing a capped, unpreserved bottle at the required depth and uncapping the bottle to collect water beneath the surface. The bottle was capped below the surface before retrieval. The sample was then pumped through a 0.45-micron filter using a peristaltic pump, into the appropriate laboratory sampling container for the analyses to be conducted.

The surface water samples were collected either during an incoming or outgoing tide, at sampling locations near the shore (between "A" and "B" sediment sample locations on the transects). Surface water samples were collected at approximate mid-tide when the flow of the surface water is the strongest, and at approximate mid depth of the water column at time of sampling. At time of sampling, the surface water sampling locations were approached from into/against the stream flow, in an effort to minimize sediment disturbance at the sampling area.

In addition to the collection of surface water samples for chemical analysis, water quality parameters, including dissolved oxygen, pH, temperature, oxidation reduction potential, specific conductivity, conductivity, and turbidity, was measured at each sampling location using a field portable water quality sonde (YSI 600 series). The water quality probe was advanced to the same depth as the water sample collection, parameters were allowed stabilize/equilibrate, and water quality readings were recorded. Field notes of the surface water collection activities prepared by Haley & Aldrich are provided in Appendix A.

2.2.4 Sediment Sample Analyses and Results

Sediment samples collected were placed into coolers on ice and were submitted to Alpha Analytical Laboratories in Mansfield, Massachusetts for analysis of the following: RCRA 8 metals as well as copper, nickel, and zinc by USEPA Methods 6020 and 7474, and Acid Volatile Sulfides/Simultaneously Extracted Metals (AVS/SEM) according to USEPA metals mixtures guidance (EPA-821-R-91-100). Haley & Aldrich requested that the laboratory achieve analytical reporting limits sufficiently low for comparison to applicable ecological screening criteria.

In accordance with the quality assurance program, two blind field duplicate samples were collected and analyzed to meet method-specific QA requirements. Blind field duplicate samples for metals analysis were obtained from the same material as the native sample and deposited into separate sampling containers. These blind duplicate soil samples were collected from parent samples and submitted as separate blind samples where the “subsample submitted for analysis with a composition and identity known to the submitter but unknown to the analyst”. Laboratory Matrix Spike or Matrix Spike Duplicate analysis was conducted on one sample collected for metals. For the sample where Laboratory Matrix Spike or Matrix Spike Duplicate analysis was conducted, additional soil sample quantity was obtained from the same material as the native sample. The additional soil material was deposited into a separate sampling container and submitted for analysis. Alpha Analytical reports and data validation are attached in Appendix B.

Analytical results for the sediment samples are summarized in Table I and were compared to the Ecological Screening Level benchmarks. Maximum concentrations of arsenic and cadmium were detected below the Ecological Screening Level benchmarks. The maximum values for the remaining COPECs (barium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc) were observed to be above the Ecological Screening Level, which is the “Effects Range – Median” developed for marine waters. AVS, SEM and the fraction of sediment organic carbon (f_{oc}) analysis was conducted to evaluate bioavailability of metals in sediment according to USEPA’s guidance for determining bioavailability of metals mixtures. Figure 3 presents concentrations of chromium, lead and copper detected in sediment samples at each sampling location. Results of the sediment sample analysis are further discussed in the pending Screening Level Ecological Risk Assessment.

In addition to the chemical analysis conducted six sediment samples were selected and analyzed for lead compounds by Scanning Electron Microscopy (SEM/EDS) to differentiate lead from slag vs. lead from antifouling paint residues. The SEM/EDS lead analysis was conducted on the two sediment samples collected from Boat Transect S1 locations (B-S1-A, and one from B-S1-B) and on the two sediment samples collected from Site Transect S5 locations (S5-A and S5-B). Boat Transect S1 and Site Transect S5 are the two sampling transects located nearest to the boat yard. The remaining SEM lead analyses were conducted on samples with the highest total lead concentrations detected from the remaining sediment samples; at S4-A and a second sample from B-S1-A. These analyses were performed by MicroVision Laboratories of Chelmsford, MA and are attached in Appendix C. Results of the microscopy indicated that none of the sample analyzed detected the presence of red lead, demonstrating that lead detected in sediment samples analyzed could not be associated from antifouling paint residues from the adjacent Bass Haven Yacht Club.

2.2.5 Surface Water Sample Analyses and Results

The six surface water samples collected placed into coolers on ice and were submitted to Alpha Analytical Laboratories in Mansfield, Massachusetts for laboratory analysis of RCRA 8 metals and copper, nickel, and zinc by USEPA Methods (6020/7474). Alpha Analytical reports and data validation are attached in Appendix B.

Analytical results for the surface water samples are summarized in Table II and compared to the National Recommended Ambient Water Quality Criteria. As indicated in Table II, only barium and mercury were detected above the applicable reported detection limits. None of the mercury results were detected above the ecological screening criteria. There is no National Recommended Water Quality Criterion for barium in seawater, therefore, the concentrations detected in surface water reflect natural levels of barium in seawater.

Additionally, all the physical parameters measured in seawater in the field (i.e., temperature, dissolved oxygen, pH, turbidity, oxidation-reduction potential) were within normal ranges for marine waters. Results of the surface water sample analysis are further discussed in the Screening Level Ecological Risk Assessment.

2.3 DECONTAMINATION

Prior to the commencement of sampling, a decontamination station and a clean sample receiving station was constructed. Sampling equipment used was decontaminated prior to sampling, between sampling intervals, and following sampling. The decontamination process consisted of a deionized water rinse, a scrub with an alconox and water solution, an additional deionized water rinse, and drying equipment with paper towels. Dedicated sampling equipment were discarded after use.

2.4 WORK PLAN DEVIATIONS

Two minor deviations from the Quality Assurance Project Plan occurred:

- Total Organic Carbon (TOC) analysis was conducted on sediment samples collected during the investigation program. Although not specifically described in the QAPP, the TOC analysis was added to the program as the data is required for interpretation of the AVS/SEM metals results collected from the associated sediment samples.
- Surface water samples collected were field filtered using a 0.45-micron filter, for analysis of dissolved metals. The process of field filtering the surface water samples, and that metals analysis would be dissolved, rather than total was not specifically described in the QAPP. Dissolved metals analysis was conducted as EPA requires the dissolved metals species be compared against the National Recommended Ambient Water Quality Criteria.

2.5 DATA QUALITY ASSESSMENT

In accordance with the QAPP Form B, a Data Usability Summary Report (DUSR) was prepared for the Alpha Analytical data packages based on the USEPA Contract Laboratory Program National Functional

Guidelines. The DUSRs prepared for the current analytical program are attached in Appendix B. Minor quality control deviations were qualified accordingly as follows:

- The DUSR for Sample Delivery Group # L1739241 indicated that a low level of mercury (0.000010 mg/L) was detected in the method blank. Positive results for aqueous samples are qualified accordingly.
- The DUSR for Sample Delivery Group # L1739004 indicated that a low level of mercury (0.003 mg/kg) was detected in the method blank. Positive results for solid samples are qualified accordingly. The TOC results for laboratory duplicate pairs for sample S5A1-102617-1205 slightly exceeded RPD control limits and are qualified accordingly. The copper results for field duplicate pairs for sample S4A1-102617-1310 exceeded RPD control limits and are qualified accordingly. The mercury results for field duplicate pairs for samples BS1A-102617-1335 and S4A1-102617-1310 exceeded RPD control limits and are qualified accordingly.

Based on our review, no data were rejected from consideration and the data usability is 100%.

2.6 INVESTIGATION PROGRAM SUMMARY

The following conclusions are made on execution of the sediment and surface water investigation program:

1. The Site investigation activities were conducted in general accordance with the "Quality Assurance Project Plan, Investigation of Intertidal Sediment, Retail Development – South Parcel Shoreline, Former United Shoe Machinery (USM) Facility, Beverly, Massachusetts, USEPA ID No. MAD043415991" (QAPP) dated 25 August 2016 and approved by EPA on 29 August 2016.
2. Analytical data met quality control performance standards, indicating that the data can be used for risk assessment decisions.
3. The data collected from the sediment and surface water investigation is sufficient to support the forthcoming Screening Level Ecological Risk Assessment to be completed for the Site.

3. Overview of Screening Level Ecological Risk Assessment

As discussed above, the goal of the SLERA is to differentiate between exposures that can be concluded to present no risks (i.e., ‘pass’ the screening) and data that, due to the application of conservative assumptions, are insufficient to support a “no-risk” conclusion (i.e., ‘fail’ the screening). Conclusions from a SLERA are that a set of analytes, receptors, and locations are not at risk, or alternatively that information is insufficient to exclude the potential for risk.

In the initial screening evaluation, *maximum* contaminant concentrations within each medium of concern are compared to conservative literature-derived toxicity *screening* values. These toxicity values are generally referred to as toxicity reference values (TRVs), which are published screening-level benchmarks, no observed effects concentrations (NOECs), and/or no observed adverse effects levels (NOAELs).

If the conservative evaluation of COPECs against the lowest TRVs result in a conclusion of no risk, (passing the screening), the SLERA process is considered complete, and no further ecological risk evaluation is recommended. If one or more of the COPECs, when compared to the TRVs, exceed the conservative screening reference values, the SLERA is generally expanded to include a “refined” screening evaluation. The refined screening evaluation does not require the collection of additional site-related data, but rather, applies more realistic risk assumptions and/or allows for the use of a range of TRVs, to further evaluate potential ecological risks at a site.

Depending on available data, elements of the refined screening evaluation for a site may include comparison to less conservative TRVs, comparison to “background” concentrations, a low frequency of exceedances (to TRVs) and/or detections, a low incremental risk (e.g. based on food chain exposures), or an adjustment of the exposure (or TRV value) based on low bioavailability or bio accessibility.

4. Problem Formulation

The objectives of Problem Formulation are to identify the focus and scope of the SLERA, and to develop a problem statement that will define the goals and objectives of the subsequent analysis/assessment. Typically, the Problem Formulation for ERAs includes the development of a Conceptual Site Model (CSM), characterization of potential habitat that may be present at site, selects receptors of interest, and identifies assessment of measurement endpoints. As part of the SLERA, a Problem Formulation was completed for the former South Parcel site to develop an ecological problem statement that could be tested using existing information to evaluate potential ecological risks.

The following section includes pertinent information that was used in the Problem Formulation process. The sub-sections present a description of the Site setting, a summary of the past monitoring data, development of the Conceptual Site Model for the ecological setting, the identification of COPECs using Site data, and the identification of the ecological aspects of the Site that may need to be protected from adverse exposures (referred to as “assessment endpoints”) as well as how the assessment endpoints were evaluated (“measurement endpoints”).

4.1 PHYSICAL AND ECOLOGICAL SETTING

The South Parcel is located on the northeast side of the “head” of the tidal portion of the Bass River. A National Wetlands Inventory map that provides the applicable habitat classifications by the US Fish and Wildlife Service is presented in Figure 4. As discussed in Section 2.1, there are upstream two ponds (Upper and Lower Shoe Ponds) that feed into the embayment adjacent to the South Parcel. Upper Shoe Pond is primarily fed by surface water discharge from the Bass River. Water from the Upper Shoe Pond flows over a dam into Lower Shoe Pond which is ~3 acres in size. Both ponds are classified as PUBHh, which Upper Shoe Pond means they are small (<20 acres), man-made (impounded), permanently flooded freshwater ponds. Drainage from a large segment of Beverly (the North Beverly Brook Drainage Basin) flows through culverts under the North Parcel site and merge into a point discharge into the Lower Shoe Pond. The Lower Shoe Pond then drains over a dam into the Bass River via a covered channel. The dam separates the fresh inland waters from the tidally-influenced lower stretch of the Bass River.

The shoreline area of concern adjacent to the South Parcel is categorized as E2USN (Figure 4), which means the system is classified as estuarine (brackish water) and the regular tidal ebb and flow in a quiescent, low energy embayment results in “tidal flats”. The daily low- and high-water boundaries, the mean of which is delineated on Figure 2, will often vary with the position of the moon which controls the tides. All the areas that were sampled, which are partially or permanently underwater, are depositional in nature and designated as shell fishing beds.

When developing the QAPP for this site, surface water and sediment sample locations were segregated into three areas, as shown on Figure 2. The “Site Area” (transects S1 through S5) was delineated to determine if the apparent slag residuals observed along the shoreline of the Retail Portion - South Parcel (historical fill) may have contaminated intertidal surface water and/or sediment. The “Yacht Club” (transect B-S1) was primarily identified to assess whether lead paint from historical activities within the boat yard may have biased the measurement of lead in samples within the Site Area. The “Reference Area (transects R1 through R4) was chosen to define “background” concentrations that would be unaffected by the Site Area.

The spatial positions of individual sampling stations were located in an effort to maintain similar water depths for each letter designation (e.g., A, B or C). Samples were positioned to cover approximately 1.5 acres in both the Reference Area and Site Area. It is important to note that, because the Upper and Lower Shoe Ponds have received both point and nonpoint discharges from upstream sources, concentrations of metals in sediments within the Reference Area would fall within the category of “anthropogenic background” and not “natural background” (i.e. levels of metals might be expected to be elevated over risk-based screening levels).

4.2 SUMMARY OF PAST MONITORING DATA - SOUTH PARCEL SOIL/SLAG INVESTIGATION

In 2012 Haley & Aldrich conducted an investigation of the South Parcel shoreline to evaluate potential soil contamination due to the presence of apparent slag observed in exposed fill materials. That investigation, entitled “QAPP Data Summary Report, Retail Development - South Parcel,” dated 31 May 2012 is instructive to this SLERA as some of the slag residuals obtained above the mean high-water mark were directly sampled and analyzed for metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc).

Table III of the 2012 QAPP Report presents metals in samples of slag obtained from the shoreline adjacent to the South Parcel, and is attached in Appendix F of this report for reference. Cadmium, selenium and silver were below the limit of detection in all the samples. Mercury was only detected in 3 of 7 samples with an average and maximum of 1.2 and 4.8 mg/kg, respectively. The average and maximum values for the remaining metals were as follows:

<u>Compound</u>	<u>Average Conc. (mg/kg)</u>	<u>Maximum Conc. (mg/kg)</u>
• Arsenic	17	56
• Barium	22	42
• Chromium	40	75
• copper	184	430
• lead	84	360
• nickel	36	61
• zinc	192	600

One soil sample exhibited an anomalously high lead concentration of 36,000 mg/kg. Additional forensic analysis of this sample revealed the presence of paint chips, most likely related to historical application of lead paint to boat hulls. Because one goal of this SLERA is to identify if slag is responsible for metals contamination in sediment, these past analyses may be informative in the geochemical evaluation of the metals in sediment.

4.3 CONCEPTUAL SITE MODEL

The presence of apparent slag residuals on the shoreline and in the sediments adjacent to the South Parcel is apparently due to historical filling and potentially originated from the former USM facility North Parcel; the drop forge historically operated at the South Parcel did not produce slag which is commonly associated with foundry operations. The USEPA is concerned that metals from historic slag residuals may have contaminated surface water and/or sediment and, if so, that the metals may have an adverse effect on aquatic life.

As discussed in the RCRA Ecological Receptor Exposure Pathway Scoping Checklist that was submitted to USEPA in 2013, it is the opinion of Haley & Aldrich that most of the slag residuals were deposited close to or above the high water mark and that “decades of regular diurnal tidal cycling would have leached bioavailable constituents of concern away from the existing slag-like pieces” and that the “metals data presented in the QAPP Data Summary Report were considered to be consistent with MassDEP background values”. The USEPA opined that, over time, slag residuals may have moved westward into the deeper water. The possibility also exists that metals may have partitioned from the slag into the surrounding sediments. Given the weight of the stony material, however, it can be assumed that metals from slag residuals would remain in sediments within the Site Area and not migrate across the Bass River.

To test the supposition that slag has contaminated ambient surface water and/or sediment, five transects, each running perpendicular to the shoreline, were positioned adjacent to the South Parcel area (Figure 2). Sample locations (12 stations in all) were placed equidistant from each other along each transect. One additional transect was situated on the property of the Bass Haven Yacht Club (two “Yacht Club” stations) to examine if boat maintenance operations (e.g., red lead) may have affected the Site Area. An additional four transects (8 sampling stations) were sited across the river to represent a Reference Area or “background” concentrations.

If the presence of the slag residuals has contaminated surface water and/or sediments, then the average concentration of each individual metal in media within the Site Area should be different from the Reference Area. If metals are elevated, the possibility exists that they may not be bioavailable and therefore would not have an adverse effect on benthic organisms. The fate and partitioning of metals in sediment can be tested for this by employing USEPA’s Equilibrium Partitioning methodology for metal mixtures (USEPA, 2005).

Figure 5 presents a graphical depiction of the SLERA Conceptual Site model from the perspective of a potential slag source, complete or incomplete exposure pathways (e.g. surface water, sediment, porewater), and potential exposure routes (e.g. gill, dermal, ingestion). It is assumed stony slag is heavy enough to remain in place within the tidal zone, but that it would be subjected to weathering on a daily basis. Metals from slag would partition to surface water and/or sediment, and possibly from sediment into porewater. From surface water, the gills of fish or invertebrates could be directly exposed. In sediment, invertebrates or wildlife could directly ingest sediment or the dermal integument could be exposed. Finally, metals that partition to porewater could serve as an exposure route for benthic invertebrates and possibly bottom-feeding fish.

Additionally, by measuring the levels of acid volatile sulfide (AVS), simultaneously extracted metals (SEM) and the fraction organic carbon (f_{OC}) in each sediment sample, the potential for each sample to pose a risk to benthic organisms can be discerned. This is done by subtracting the number of equivalents of AVS from SEM (as micromoles) and dividing the difference by the fraction of organic carbon (f_{OC}). If the quotient is less than 130 umoles/g_{OC}, then no toxicity is anticipated. If the quotient is between 130 and 3000 umoles/g_{OC}, the toxicity predicted is “uncertain”; any value above 3000 umoles/g_{OC} is anticipated to be toxic to benthic organisms.

4.4 IDENTIFICATION OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN (COPECSS)

Descriptive statistics for COPECs analyzed in surface water are presented in Table III. For surface water, arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver and zinc were all below their respective analytical limits of detection so these elements were not identified as COPECs. Only barium and mercury were detected in surface water samples, so these two elements were retained as COPECs in seawater.

Descriptive statistics used for selection of COPECs analyzed in sediment are presented in Table IV. Arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc were all detected in sediments. Selenium was detected in sediment samples from the Reference Area but not in samples from the Site Area nor the Bass River Yacht Club. Silver was not detected in samples from the Bass River Yacht Club and one of the Site Area Samples.

Maximum values for barium (112 mg/kg), lead (819 mg/kg), nickel (297 mg/kg) and zinc (498 mg/kg) were observed in samples obtained from the Bass River Yacht Club shoreline. Maximum values for chromium (1280 mg/kg) and selenium (7.45 mg/kg) were observed in samples from the Reference Area. Maximum values for arsenic (39.5 mg/kg), cadmium (2.99 mg/kg), copper (1360 mg/kg), mercury (2.3 mg/kg) and silver (4.03 mg/kg) were found in samples taken from the Site Area. As will be further discussed below, copper had two values categorized as outliers and lead had one value.

4.5 ASSESSMENT AND MEASUREMENT ENDPOINTS

According to USEPA (1997), assessment endpoints are explicit statements of the characteristics of the ecological system that may need to be protected. Assessment endpoints can be measured directly or are evaluated through indirect measures. Measurement endpoints represent quantifiable ecological characteristics that can be measured, interpreted, and related to the valued ecological component(s) chosen as the assessment endpoints. Assessment endpoints, and the associated measurement endpoints, provide information to support or refute the mechanisms and/or suppositions generated in the CSM described in the preceding section.

As discussed below, the selection of assessment and measurement endpoints used in this SLERA was partly informed by a site reconnaissance conducted at the Site in April of 2013. The following assessment and measurement endpoints were used to interpret existing data with respect to ecological risks within the study area.

- **Assessment Endpoint** - the sustainability (i.e. survival, growth and reproduction) of aquatic biota (e.g., fish and benthic invertebrates) following exposures to site-related COPECs (principally RCRA metals).
- **Measurement Endpoint** - Comparison of the maximum exposure concentration to conservative ecological screening values considered “safe” for freshwater aquatic organisms (ambient water quality criteria for surface water and the “Effects Range – Median” sediment quality values for sediment).

As presented in the USEPA SLERA guidance, if the concentrations of each individual COPEC within each medium of concern (surface water and sediment) is lower than its respective conservative screening benchmark (which is protective for the most sensitive environmental receptors and the most sensitive life stage), then that COPEC would not pose a significant risk to the environment.

5. Analysis

The analysis phase of the SLERA consists of the technical evaluation of data addressing potential exposures of receptors to COPECs, as well as potential ecological effects (typically as toxicity benchmarks). The analysis is primarily based on empirical data collected to support the previous investigations, but may also include additional assumptions to assist in the interpretation of the data.

5.1 EXPOSURE CHARACTERIZATION

For any “initial” SLERA screening, the exposure point concentrations (EPCs) are required to be the *maximum values* identified in surface water and sediment which are then compared against conservative toxicity benchmarks in Section 6 below. If any of the maximum values exceed the toxicity benchmarks, then a “refined” SLERA analysis is typically performed. The “refined” SLERA screening compares a more realistic exposure concentration (the 95% upper confident limit of the mean, or 95% UCL) for each COPEC (in each medium) instead of the maximum value against the toxicity benchmarks; the “refined” screening is less conservative, but is still considered to be a protective estimate of ecological risk for sensitive species and life stages.

As discussed above, potential risk due to exposure of COPECs in surface water is always compared to chronic ambient water quality criteria.

For sediment, it was initially observed that, for each individual metal, the mean (average) values for the Site Area were very close to the mean (average) values for the Reference Area. If a statistical evaluation were to show that there are no significant differences between the mean values of the Reference Area versus the means for the Site Area, then it would be a logical assumption that there would be no significant differences in incremental risk following exposure to COPECs in either operable unit. Thus, before proceeding into a formal SLERA, USEPA guidance (USEPA, 1997; 2002) recommends a comparison of concentrations of COPECs found in media at the site (Site Area) against “background” which is defined here as concentrations observed in sediments that are unaffected by slag residuals (Reference Area).

5.1.1 Statistical Evaluation – Comparison of Means

The first step in a statistical evaluation of metals in sediment is to test each set of variables (i.e. individual metal concentrations) for normality. This is because conventional statistical tests that determine if there is a significant difference when comparing two means is only robust if the test data populations have a normal distribution. Table V presents descriptive statistics for metals in sediment for the three areas: two samples in the Yacht Club, eight samples in the Reference Area and twelve samples in the Site Area (support for Table V is presented in Appendix D.1, Descriptive Statistics). Apart from copper and lead, the metals were normally distributed in sediment for both the Reference and the Site Areas. Copper and lead were not normal because of the presence of outliers. Consequently, a statistical comparison of normally distributed metals can be performed using traditional parametric methods; for copper and lead, nonparametric tests must be used to assess if the means of the two metals are significantly different.

It can also be observed in Table V, when comparing the mean concentrations for the Reference Area against the Site Area, that the values appear to be relatively close together. Additionally, a visual

examination of the box plots in Appendix D.2 shows that, although the mean values may differ slightly, there is a good overlap of the data ranges for most metals. These plots also show that copper has two significant outliers for the Site Area dataset and lead has one significant outlier.

The next step was to compare the mean values of each individual metal using analysis of variance (ANOVA) multiple comparison tests (NCSS Statistical Software, Version 8.0.12). For metals that were normally distributed in sediment, ANOVA multiple comparison tests included the Tukey Kramer Test, Fisher's LSD Test, Bonferroni's Test and Sheffe's Test (Appendix D.3). For copper and lead, which were not normally distributed, the statistical evaluations used nonparametric tests (Mann Whitney U Test and Kruskal Wallis Test (Appendix D.4).

Table VI presents the results of these multiple comparisons using a significance level of $p = 0.05$. The results show that the mean values for the metals in sediment samples from Site Area are not statistically different than the mean values estimated from the Reference Area. The only metal that showed a statistical difference was for lead, where the mean values for the Bass River Yacht Club was significantly higher than the Reference Area and Site Area.

5.1.2 Geochemical Evaluation – Relationships between Metals

Because risk is directly proportional to concentration, risk(s) estimated for the Site Area would not, based on the analysis above, be statistically different from the Reference Area. This does not imply that the sediments in either area do not pose a risk to benthic invertebrates and/or wildlife. It does, however, imply that the metals in the Site Area are, in all likelihood, not derived from slag residuals. The supposition that metals are not related to contamination from historical activities can be further supported by an evaluation of the geochemistry of the sediments.

First, barium, chromium, cadmium and silver appear to be uniformly distributed throughout both the Reference and Site Area (Figure 6). Two of these metals, however, were not detected in any of the more concentrated slag samples that were analyzed in 2012 (Appendix F). Secondly, the average (mean) concentrations of every metal analyzed in slag in 2012 is less than the same respective metals analyzed for the SLERA (Table V). The mean concentrations of barium, chromium, copper and lead for this investigation are, respectively, 3, 18, 1.5 and 3.7 times higher than the levels measured in slag in 2012 soils investigation.

Finally, an evaluation of the relationships between individual metals in sediment was performed using data for both the Site Area and Reference Area (Appendix E, Table E1). A Pearson's correlation matrix was generated (Appendix E, Table E2) which showed that there was a robust correlation between barium, cadmium, chromium and silver ($r^2 > 0.82$) from both the Reference Area and the Site Area.

Figure 6 presents scatterplots with regressions for plotted for barium against chromium and cadmium against silver. The slopes of these regressions are statistically identical which indicates the relative proportions of all four metals are the same for both the Reference Area and Site Area. The relationship between barium vs. cadmium and silver vs. chromium are also highly significant. Because the distributions for these metals overlap and there is no statistical difference between the slopes of the two lines, it one can conclude that the "source" for these metals was, in all likelihood, not related to the historical slag residuals from the former South Parcel facility.

5.2 BIOAVAILABILITY– AVS/SEM

In the aquatic environment, bioavailability of metals is controlled by different water quality and sediment characteristics. Sediment variables such as organic matter, iron and manganese oxides, carbonates, and clay content will bind metal ions and reduce their availability to aquatic organisms. In anoxic sediments, sulfate reduction by anaerobic bacteria leads to the formation of iron sulfides (FeS). Any freely available divalent metals in sediment will preferentially bind to this sulfide as the solubility product for these metals is smaller than the solubility product for FeS (i.e., anthropogenic metals will bind to sulfide more strongly than naturally occurring iron). This endpoint is site-specific as it directly measures the concentration of sulfides in sediments that are prevalent in estuarine and marine environments.

Both the total amount of sulfide and divalent metal ions in a sediment sample can be measured in the laboratory by the addition of acid (1 N HCl). The metals are liberated as simultaneous extracted metals (SEM) and “acid volatile sulfide” (AVS). For the initial research conducted in the 1980’s, if the AVS:SEM ratio in sediment was greater than one, then metal sulfides in pore water would exist as a precipitate and no toxicity was observed. If the AVS:SEM ratio was less than one, metals could be “bioavailable” in pore water and toxicity was observed (USEPA, 2005b).

Comparisons of the Site Area means to the Reference Area means provide a basis for determining if metal concentrations are elevated in South Parcel sediment, but they provide insufficient information regarding the potential bioavailability and toxicity of those metals. Similarly, ERMs are generic screening-level benchmarks that are based on measures of bulk metals in sediments and do not consider Site-related factors that limit metals bioavailability and toxicity. As the USEPA indicates in the Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA, 2005a, Page 2-6):

“Concentrations of bulk (total dry weight basis) metals in sediment alone are typically not good measures of metal toxicity. However, in addition to direct measurement of toxicity, EPA has developed a recommended approach for estimating metal toxicity based on the bioavailable metal fraction, which can be measured in pore water and/or predicted based on the relative sediment concentrations of acid volatile sulfide (AVS), simultaneously extracted metals (SEM), and total organic carbon (TOC) (U.S. EPA 2005b). Both AVS and TOC are capable of sequestering and immobilizing a range of metals in sediment.”

These methods are described in the USEPA’s Procedures for Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc) (USEPA, 2005b). The ESB Guidance provides a rigorous methodology for assessing the factors that limit the bioavailability and toxicity of metals. The guidance recognizes the importance of AVS and organic carbon in sequestering metals in sediments, limiting their presence in porewater, which is the primary route of exposure for benthic organisms (USEPA, 2005b; Di Toro et al., 2005). The ESB Guidance establishes the scientific basis for evaluating the bioavailability and toxicity of metals in sediments, and provides detailed methodology for quantitatively assessing the metal binding capacity of sediments.

As presented in the QAPP, SEM, AVS and f_{OC} were measured in each sediment sample and the results calculated by subtracting AVS from SEM, then dividing the difference by f_{OC} . If the result is below 130 umoles/gOC, then a “prediction”, based on the USEPA guidance above, can be made that divalent

metals (cadmium, copper, lead, nickel, zinc, silver) are not bioavailable and therefore no toxicity is anticipated to benthic organisms.

5.3 EFFECTS ASSESSMENT

Consistent with the SLERA guidance, the initial screening of each media of concern compares the *maximum value* in each media of concern to the most conservative toxicological benchmark (usually a “no observed adverse effect level”, an NOAEL).

Toxicity benchmarks used as screening values were obtained from the Risk Analysis Information System database (ORNL, 2018). For surface water, Table I presents the “Ecological Surface Water Screening Levels”, which are National Recommended Water Quality Criteria. If no NRWQC values were available, OSWER Tier II Secondary Surface Water Screening Values were selected (Suter and Tsao, 1996).

For metals in sediment, the NOAA Effects Range Median (ERM) values were selected (MacDonald et al., 2002). The ERM represents the chemical concentration above which adverse effects to benthic invertebrates would be expected to frequently occur.

With regard to bioavailability, which is an indirect measure of toxicity, the USEPA sediment metals ESB guidance (2005b) shows, using field and laboratory data, that after subtracting AVS from SEM (in $\mu\text{moles/g}$) and normalizing by the fraction organic carbon, a prediction can be made as to whether a range of metals concentrations is either nontoxic or toxic to benthic invertebrates. Sediments with $(\text{SEM}-\text{AVS})/\text{f}_{\text{OC}} < 130 \mu\text{mol/gOC}$ are predicted to be nontoxic. Values between 130 and $3,000 \mu\text{mol/gOC}$ lie where the prediction of toxicity is uncertain, and values greater than $3,000 \mu\text{mol/gOC}$ are predicted to be toxic. This endpoint is generally accepted by the regulatory and scientific community.

6. Screening Level Risk Characterization

COPECs were screened by comparing the maximum value to the applicable Ecological Screening Level benchmark. If the maximum value exceeds the screening benchmark, the USEPA guidance recommends that potential risk be further evaluated in a Baseline Ecological Risk Assessment (BERA).

6.1 SURFACE WATER – PROTECTION OF AQUATIC ORGANISMS

Mercury was detected in all surface water samples, but all the concentrations were below the National Recommended Water Quality Criterion of 0.00077 mg/L. Barium was also detected in every surface water sample and its selection as a COPEC is more a reflection of the conservative nature of the screening value (there is no National Recommended Water Quality Criterion for barium in seawater). In natural seawater, barium can range from <0.007 to 0.017 mg/L (Dehairs, undated). Therefore, the concentrations seen in surface water within the Site Area reflect natural levels of barium in seawater. Based on this analysis, none of the metals identified in seawater would be expected to pose a risk to aquatic organisms. Additionally, all the physical parameters measured in seawater in the field (i.e., temperature, dissolved oxygen, pH, turbidity, oxidation-reduction potential) were within normal ranges for marine waters.

6.2 SURFACE WATER – PROTECTION OF WILDLIFE

Ambient water quality criteria are not only protective to aquatic organisms but to wildlife that feed on fish and/or shellfish. Since mercury was below its respective screening criterion, wildlife would not be at risk to mercury in seawater. Barium was deemed to be naturally occurring and is also not a priority pollutant so that element would also pose no significant risk to marine birds and/or mammals.

6.3 SEDIMENT – PROTECTION OF BENTHIC ORGANISMS

For sediment, maximum values for arsenic and cadmium were below the Ecological Screening Level benchmarks (Table II). When assessing the dataset as a whole, the maximum values for the remaining COPECs (barium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc) were observed to be above the Ecological Screening Level, which is the “Effects Range – Median” developed for marine waters (MacDonald, 2000; NOAA, 2018). Interestingly, the maximum values for chromium (R4-B) and selenium (R4-A) were located within the unimpacted Reference Area (selenium was not observed above the detection limit in the Site Area samples). Within the Site Area alone, maximum values for nickel (47 mg/kg) and zinc (341 mg/kg) were lower than their respective ERM values of 51.6 and 410 mg/kg.

As required by the QAPP, several samples that were elevated for lead required further evaluation for the presence of lead paint, but all the samples were negative when assessed using scanning electron microscopy. Therefore, the adjacent Bass Haven Yacht Club has no apparent influence regarding the contribution of lead to sediments within the Site Area.

At this point in the SLERA, metals that exceed the ERMs would be further evaluated in a “refined” analysis by comparing the 95th UCL of the mean to the applicable ERMs. However, as discussed above, it is clear that all that there is no statistical difference between the mean (average) values estimated for the Site Area and the mean values for the Reference Area. It can therefore be concluded that the metals in the Site Area are, in all likelihood, not related to the presence of historical slag residuals. This

supposition is further supported by the a) lower metal concentrations in historical slag samples (Appendix F) and b) the geochemical evaluation above (Section 5.1.2) which demonstrated that the ratios (slopes) were parallel for several metal pairs (barium and chromium; cadmium and silver) even though the samples were taken on opposite sides of the Bass River.

This does not, however, preclude risk to benthic macroinvertebrates. Therefore, an analysis of the bioavailability of metals in sediment was performed by measuring AVS, SEM and the fraction of sediment organic carbon (fOC) according to USEPA's guidance for determining bioavailability of metals mixtures. This direct line-of-evidence carries the greatest amount of weight for ecological risk assessment because it is site-specific and, although bulk COPECs in sediment can 'appear' elevated, it is the actual porewater concentration that determines toxicity to a benthic organism.

The SEM/AVS ratio in almost every sediment sample was less than 1 (Figure 7), indicating an excess of binding capacity which would eliminate bioavailability for divalent metals to benthic organisms (no sulfide was detected in S2-A and S5-A, which is anticipated as these upper shoreline locations are exposed for long periods of time). When the binding of the fraction of organic carbon is factored in, all of the estimated values (AVS – SEM/f_{OC}) were less than 130 umole/gOC. Thus, the amount of excess binding capacity provided by both AVS and organic carbon provides is sufficient and divalent metals in porewater would not be bioavailable. Subsequently, no toxicity would be predicted. A finding of "no significant risk" is therefore concluded for benthic organisms that utilize the mud flats of both the Reference Area and the Site Area.

6.4 SEDIMENT – PROTECTION OF WILDLIFE

The potential risk to wildlife is directly proportional to the concentration(s) of COPECs in sediment: the higher the concentration of site-related constituents, the higher the risk. Potential risk is typically evaluated by assuming that marine birds and mammals that inhabit or forage in the Site Area may be exposed to sediment that contain COPECs. A typical direct exposure scenario would be a bird (e.g., great blue heron, seagull, mallard) or a mammal (e.g., seal) inadvertently ingesting sediment, usually during feeding. An indirect exposure scenario would be consumption of prey (e.g. fish) that had accrued COPECs through the process of bioaccumulation. Estimation of exposure is made using a simplified food chain model. The resulting dietary exposure concentrations (mg/kg/day) are then compared to "safe" toxicity reference values (TRV, mg/kg/day). If the exposure concentration is less than the TRV, then a condition of No Significant Risk can be declared.

As demonstrated above, there is difference in metal(s) concentration when comparing the average value of any individual metal in the Site area against the average value for a respective metal in the Reference Area. Because risk is directly proportional to concentration, it is logical to conclude that the risks presented by COPECs in sediment would be equivalent for both the Site Area and the Reference Area, i.e. there is no additional risk posed by the presence of historic slag residuals on the shoreline of the South Parcel (for selenium, which was not detected in any Site Area sediment sample, any putative risks would be relatively lower in the Site Area).

Accordingly, it can be concluded that the risks to wildlife following exposure to sediments in the Site Area would, relative to the Reference Area, pose no incremental risk(s) to marine wildlife.

7. Uncertainty Assessment

In the practice of performing risk assessments, issues surrounding the evaluation of uncertainty in determining chemical hazard addresses “assumptions” made about environmental parameters (e.g. fate and transport) or exposure variables (e.g. how much land area a receptor may be exposed to). This SLERA was completed as a direct comparison of the media concentration (maximum or 95% UCL) to conservative screening or refined toxicity benchmarks (e.g. water quality criteria or sediment quality value).

The analytical data collected during investigations at the Site that was used for this evaluation were based on samples of surface water and sediment collected in 2017, so the level of uncertainty, from an analytical viewpoint, is low. The metals data is robust although for some elements, the normal amount of analytical variability can be as much as 50%.

The Equilibrium Partitioning (EqP) approach was used because it measures the bioavailability of metals in different sediment types and allows for the incorporation of the appropriate biological effects (USEPA. 2005b). This provides for the derivation of benchmarks that are causally linked to the specific chemical, applicable across sediments, and appropriately protective of benthic organisms. The measurement of AVS/SEM has received some criticism in the scientific literature as some argue that sulfides, and thus bioavailability, can vary considerably from season to season. For this study, samples were taken from intact cores taken *in situ* in the fall. Most samples were black indicating reducing conditions, so there is a high level of confidence that sulfides had not reacted with the atmosphere. Additionally, the only samples where sulfides were not measured were a few stations located closest to the high-water mark. This is logical as these locations were looser, sandier and exposed for longer times during each tidal cycle.

With regard to toxicity benchmarks, ambient water quality criteria for surface water are based on chronic effects and are therefore conservative. It can therefore be confidently stated that any COPEC concentrations below these criteria are protective of all aquatic life.

The sediment benchmarks selected, the Effects Range – Median values published by NOAA, are less certain in terms of protectiveness. The ERM represents the chemical concentration “above which adverse effects to benthic invertebrates would be expected to frequently occur” (MacDonald *et al.*, 2000). Limitations of the use of sediment quality values include: 1) do not take into account cause and effect; 2) do not take into account physicochemical interactions of the sediment and thus lack site-specificity; 3) values for individual metals do not account for the combined effect of the sediment mixture; 4) are often lower than background (i.e. too conservative); and 5) do not account for sensitivity of different individual organisms (Chapman *et al.*, 1999).

Finally, the geostatistical interpretation of the metals data serves as an excellent internal check with regard to the historical source of the metals in the sediment. Because some of the bulk metals concentrations in sediment from both the east (Site Area) and west (Reference Area) sides of the Bass River showed significant parallelism with regard to linear regressions, it can be concluded that slag residuals are, in all likelihood, not the source of any elevated metals in sediments.

8. Summary

The purpose of this SLERA, which was generally conducted according to USEPA risk assessment guidelines (USEPA, 1997), was to examine if site-related metals (purportedly in slag) may pose a potential risk to aquatic biota. In July 2011 and April 2013, site reconnaissance was conducted by the parties involved and it was concluded that slag from the historical activities was present on the South Parcel shoreline. This slag was not shown to present a risk to human health, but a decision was made that a SLERA should be conducted because a RCRA Corrective Action Ecological Receptor Exposure Pathway Scoping Checklist had shown that several exposure pathways were complete and therefore a potential risk may exist for aquatic biota.

The area of concern is the western shoreline of the Former USM South Parcel property. The Site Area sediments are primarily shallow tidal mudflats located in an embayment at the upper end of the Bass River. The design of the field investigation identified sample locations within the South Parcel shoreline as the “Site Area” (transects S1 through S5), a small parcel adjacent to the Bass Haven Yacht Club (transect B-S1), and an unimpacted “Reference Area (transects R1 through R4) to define “background” concentrations (unaffected by the Site Area). The spatial positions of individual sampling stations were located to maintain similar water depths for each letter designation (e.g., A, B or C) and samples were positioned to cover approximately 1.5 acres in both the Reference Area and Site Area.

A CSM was formulated which showed the primary receptors of concern would be fish exposed to surface water and benthic invertebrates/wildlife exposed to sediment. It was generally assumed that site-related slag, which had been subjected to daily weathering, would be heavy enough to remain in place. Additionally, if sediment metals are found to be elevated, any factors that may reduce bioavailability, and therefore subsequent exposure and risk (e.g., the ration of AVS to SEM), were also examined.

For COPEC selection, most metals in surface water were below the method detection limit; barium and mercury were detected but both were observed to be below ecological screening level. Surface water was therefore eliminated as a media of concern. For sediment, all metals analyzed were detected although selenium in samples from the Site Area was not observed above the method detection limit. All metals in sediments were retained as COPECs because the maximum value in at least one sample exceeded the respective ecological screening level.

In the analysis phase, average concentrations of each metal in sediments within the Site Area were statistically compared to average concentrations for the respective metal in sediments within the Reference Area (background); the two samples within the Yacht Club property were also evaluated against the other two areas. Metals that were normally distributed were evaluated using traditional parametric tests, while data that were non-normal were evaluated using nonparametric methods. All tests showed no statistical differences between the Site Area versus the Reference Area. The only metal that showed a statistical difference was for lead, where the mean values for the Bass River Yacht Club was significantly higher than the Reference Area and Site Area. Because no statistical difference was evident in concentrations between sediments on both sides of the river, it can be logically concluded that no incremental risk would exist for wildlife (either birds or mammals) that are exposed to sediments in the Site Area.

An evaluation of bioavailability using USEPA Equilibrium Partitioning methodology showed that all of the estimated values (AVS – SEM/foc) were less than 130 umole/gOC (no toxicity anticipated). Based on the degree of excess binding capacity divalent metals in porewater would not be bioavailable. Based on the above lines-of-evidence, a finding of “no significant risk” is concluded to exist for benthic organisms that utilize the mud flats of both the Reference Area and the Site Area.

The conclusion of no significant risk for the Site Area is supported by a statistical evaluation of the geochemistry of the sediments which showed, for some metal pairs (e.g. barium and chromium; cadmium and silver), strong parallel regressions when analyzed using data from both the Site Area and the Reference Area. This observation is evidence that the metals in sediments from both areas are not related to metals in slag (concentrations from analysis of slag samples in 2012 also provide evidence that metals in bulk sediment in this investigation are not related to historical fill quality at the South Parcel).

Based on the above multiple lines-of-evidence, it can be confidently concluded that historical slag residuals on the shoreline of the South Parcel do not pose a risk to benthic invertebrates and wildlife.



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TABLES

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TABLE I
SUMMARY OF SEDIMENT QUALITY DATA
BEVERLY USM
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Location Name Sample Name	NOAA Effect Range-Low (ERL) (mg/kg)	NOAA Effect Range - Median (ERM) (mg/kg)	Boat Transect S1			Site Transect S5		Site Transect S4			
			BS1A-102617-1335 10/26/2017 L1739004-01	BS1A-102617-0002 10/26/2017 L1739004-15	BS1B-102617-1215 10/26/2017 L1739004-02 DUPLICATE	S5A1-102617-1205 10/26/2017 L1739004-03	S5B1-102617-1125 10/26/2017 L1739004-04	S4A1-102617-1310 10/26/2017 L1739004-05	S4A1-102617-0001 10/26/2017 L1739004-16	S4B1-102617-1135 10/26/2017 L1739004-06	S4C1-102617-1025 10/26/2017 L1739004-07 DUPLICATE
Acid Volatile Sulfide w/Simultaneously Extracted Metals (umoles/g)											
Cadmium, Total	NA	NA	ND(0.00142)	-	ND(0.006876)	ND(0.001842)	0.008711	0.004138	-	0.009925	0.01283
Copper, Total	NA	NA	1.92573	-	0.46892	1.09407	0.190574	3.61259	-	0.421287	0.554715
Lead, Total	NA	NA	1.28629	-	0.385676	1.22339	0.58417	1.78885	-	0.653316	0.853123
Nickel, Total	NA	NA	0.445673	-	ND(0.131671)	0.070978	0.068265	0.20806	-	0.139691	0.136344
SEM/AVS Ratio	NA	NA	NA	-	0.09598	NA	0.110222	0.644711	-	0.181001	0.084717
Sulfide, Acid Volatile (umoles/gm)	130	NA	ND(0.099)	-	28.8	ND(0.129)	26.4	10.6	-	19.1	42.6
Zinc, Total	NA	NA	1.7067	-	1.90962	0.94091	2.05813	3.00915	-	2.88622	2.90506
MCP Total Metals (mg/kg)											
Arsenic, Total	8.2	70	35.6	34	18.8	27.3	25.5	16.8	19.1	28.2	35.8
Barium, Total	NA	NA	69.1	72.8	112	46.4	88.8	44.8	48	107	98
Cadmium, Total	1.2	9.6	0.3781	0.4086	1.369	ND(0.28)	2.458	0.6652	0.5879	2.614	2.587
Chromium, Total	81	370	366	320	538	144	996	249	165	1190	1120
Copper, Total	34	270	419	516	150	202	139	364	1360	162	1210
Lead, Total	46.7	112	819	777	232	622	282	389	385	332	389
Nickel, Total	20.9	51.6	297	288	39.6	47	31.5	34.1	44.3	38.8	41.7
Selenium, Total	NA	NA	ND(3.12)	ND(2.87)	ND(4.57)	ND(2.8)	ND(3.65)	ND(3)	ND(3.22)	ND(4.42)	ND(3.98)
Silver, Total	1	3.7	ND(0.779)	ND(0.716)	ND(1.14)	ND(0.7)	2.54	0.779	0.863	3.56	4.03
Zinc, Total	150	410	463	498	271	315	295	291	286	341	310
Mercury, Total	0.15	0.71	2.08	1.29	0.844	0.293	1.43	0.514	0.286	2.01	1.74
Total Organic Carbon (%)											
Solids, Total	NA	NA	62.6	68.9	42.7	69	53.7	64.4	61.3	44.4	47.2

ABBREVIATIONS:

-: Not Analyzed

mg/kg: milligram per kilogram

umoles/g: micro moles/gram

NA: Not Applicable

ND (2.5): Not detected, number in parentheses is the laboratory reporting limit

TABLE I
SUMMARY OF SEDIMENT QUALITY DATA
BEVERLY USM
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Location Name Sample Name Sample Date Lab Sample ID Sample Type	NOAA Effect Range-Low (ERL) (mg/kg)	NOAA Effect Range - Median (ERM) (mg/kg)	Site Transect S3			Site Transect S2		Site Transect S1		Reference Transect R1	
			S3A1-102617-1150 10/26/2017 L1739004-08	S3B1-102617-1105 10/26/2017 L1739004-09	S3C1-102617-1010 10/26/2017 L1739004-10	S2A1-102617-0915 10/26/2017 L1739004-14	S2B1-102617-1050 10/26/2017 L1739004-11	S1A1-102617-0930 10/26/2017 L1739004-12	S1B1-102617-0945 10/26/2017 L1739004-13	R1A1-102717-1100 10/27/2017 L1739241-03	R1B1-102717-1020 10/27/2017 L1739241-04
Acid Volatile Sulfide w/Simultaneously Extracted Metals (umoles/g)											
Cadmium, Total	NA	NA	0.004623	0.012256	0.019741	0.003316	0.019315	0.016489	0.015306	0.009098	0.014366
Copper, Total	NA	NA	3.7856	0.38076	1.44797	1.14968	0.754813	0.807233	1.15015	0.839635	0.759197
Lead, Total	NA	NA	1.06253	1.03099	1.71582	0.798514	1.39076	1.40427	1.37599	0.682196	0.929513
Nickel, Total	NA	NA	0.12872	0.149253	0.213855	0.106276	0.139964	0.135595	0.175179	0.116969	0.118223
SEM/AVS Ratio	NA	NA	0.892968	0.170848	0.140559	NA	0.267781	0.250176	0.496325	1.57572	0.15912
Sulfide, Acid Volatile (umoles/gm)	130	NA	7.26	20.4	39.4	ND(0.119)	20.4	18.4	12.2	2.16	24.3
Zinc, Total	NA	NA	2.564	2.94303	3.85645	2.30384	4.54865	3.64392	4.71453	2.43785	2.97482
MCP Total Metals (mg/kg)											
Arsenic, Total	8.2	70	27.2	30.9	29.2	39.5	27.5	24.2	36.1	18.9	22.5
Barium, Total	NA	NA	47.5	106	108	35.9	83	77.3	72.8	66.4	74.2
Cadmium, Total	1.2	9.6	0.7587	2.999	2.738	0.4788	2.302	1.818	1.448	1.4	1.705
Chromium, Total	81	370	386	1110	1120	247	860	801	637	685	836
Copper, Total	34	270	162	133	139	166	124	129	121	101	133
Lead, Total	46.7	112	305	300	303	264	302	264	237	168	230
Nickel, Total	20.9	51.6	34.2	32.7	34.3	27.3	33.6	34.7	27.4	23.7	30.7
Selenium, Total	NA	NA	ND(3.44)	ND(3.98)	ND(3.97)	ND(2.74)	ND(3.9)	ND(3.41)	ND(4.04)	5.2	6.2
Silver, Total	1	3.7	1.22	3.22	3.8	0.913	2.78	3.31	1.99	1.45	2.12
Zinc, Total	150	410	337	336	324	265	327	290	338	236	295
Mercury, Total	0.15	0.71	0.588	1.9	1.73	0.381	1.53	1.1	2.3	0.973	1.04
Total Organic Carbon (%)											
General Chemistry	NA	NA	3.09	5.85	4.93	2.43	4.54	3.94	4.93	4.39	3.22
Solids, Total	NA	NA	57.2	48.6	48.2	68.6	48.6	57.4	48.2	46.4	44.9

ABBREVIATIONS:

-: Not Analyzed

mg/kg: milligram per kilogram

umoles/g: micro moles/gram

NA: Not Applicable

ND (2.5): Not detected, number in parentheses is the laboratory reporting limit

TABLE I
SUMMARY OF SEDIMENT QUALITY DATA
BEVERLY USM
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Location Name Sample Name Sample Date Lab Sample ID Sample Type	NOAA Effect Range-Low (ERL) (mg/kg)	NOAA Effect Range - Median (ERM) (mg/kg)	Reference Transect R2		Reference Transect R3		Reference Transect R4	
			R2A1-102717-1040 10/27/2017 L1739241-05	R2B1-102717-1120 10/27/2017 L1739241-06	R3A1-102717-0930 10/27/2017 L1739241-07	R3B1-102717-0945 10/27/2017 L1739241-08	R4A1-102717-0850 10/27/2017 L1739241-01	R4B1-102717-0910 10/27/2017 L1739241-02
Acid Volatile Sulfide w/Simultaneously Extracted Metals (umoles/g)								
Cadmium, Total	NA	NA	ND(0.002714)	0.01037	0.018385	0.011727	0.01064	0.015179
Copper, Total	NA	NA	0.272995	0.710288	1.39721	0.848042	0.825461	1.18766
Lead, Total	NA	NA	0.264854	0.956207	1.64147	0.910681	0.652814	1.15876
Nickel, Total	NA	NA	0.061163	0.140162	0.187284	0.117452	0.133393	0.193721
SEM/AVS Ratio	NA	NA	0.126875	0.180198	0.367411	0.21902	0.106227	0.129341
Sulfide, Acid Volatile (umoles/gm)	130	NA	9.83	18.8	49.8	15.9	36.4	39.1
Zinc, Total	NA	NA	0.913027	2.52691	16.6942	2.5052	2.89715	3.66067
MCP Total Metals (mg/kg)								
Arsenic, Total	8.2	70	23.1	32	24.2	19	24	26.7
Barium, Total	NA	NA	47.2	78.9	87.3	69.7	102	105
Cadmium, Total	1.2	9.6	0.821	1.744	2.203	2.024	2.167	2.578
Chromium, Total	81	370	362	700	1010	821	976	1280
Copper, Total	34	270	70.2	93.6	119	120	120	150
Lead, Total	46.7	112	132	218	253	199	252	332
Nickel, Total	20.9	51.6	20.9	28.9	29.3	24.7	30.8	36.3
Selenium, Total	NA	NA	4.51	5.77	6.14	5.3	7.45	6.26
Silver, Total	1	3.7	0.837	1.73	2.24	1.99	2.29	3
Zinc, Total	150	410	189	249	356	251	287	349
Mercury, Total	0.15	0.71	1.59	1.74	1.35	1.2	1.72	1.89
Total Organic Carbon (%)								
General Chemistry	NA	NA	3.5	3.16	4.17	5.4	5.04	4.77
Solids, Total	NA	NA	60.6	47.6	44.2	42.5	42.5	40.2

ABBREVIATIONS:

:- Not Analyzed

mg/kg: milligram per kilogram

umoles/g: micro moles/gram

NA: Not Applicable

ND (2.5): Not detected, number in parentheses is the laboratory reporting limit

TABLE II
SUMMARY OF SURFACE WATER QUALITY DATA
BEVERLY USM
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Location Name Sample Name Sample Date Lab Sample ID	USEPA NRWC Saltwater CCC (mg/l)	Boat Transect S1 BS10-102717-1450 10/27/2017 L1739241-14	Site Transect S5 S500-102717-1430 10/27/2017 L1739241-09	Site Transect S4 S400-102717-1420 10/27/2017 L1739241-10	Site Transect S3 S300-102717-1400 10/27/2017 L1739241-11	Site Transect S2 S200-102717-1346 10/27/2017 L1739241-12	Site Transect S1 S100-102717-1335 10/27/2017 L1739241-13
Dissolved Metals (mg/l)							
Arsenic	0.036	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Barium	NA	0.0111	0.0175	0.0133	0.0066	0.0064	0.0066
Cadmium	0.0088	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.002)
Chromium	NA	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Copper	0.0031	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Lead	0.0081	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Nickel	0.0082	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)
Selenium	0.071	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Silver	NA	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Zinc	0.081	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)
Mercury	0.00094	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001

ABBREVIATIONS:

mg/l: milligram per liter

ND (2.5): Not detected, number in parentheses is the laboratory reporting limit

TABLE III
COPEC SCREENING - METALS IN SURFACE WATER
FORMER USM SOUTH PARCEL
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Analyte	CAS No.	Frequency of Detection ⁽¹⁾	Range of Detected Concentrations (mg/L) ^(1, 2)	Location of Maximum Detected Concentration ⁽¹⁾	Ecological Screening Levels (mg/L) ⁽³⁾	Parameter Selected as COPEC ⁽⁴⁾
Barium	7440-39-3	6 / 6 100%	0.0064 - 0.0175	S500-102717-1430	0.0039	YES ASL
Mercury	7439-97-6	6 / 6 100%	0.00001 - 0.00001	ALL	0.00077	No BSL

Notes and Abbreviations:

(1) The surface water samples included in this data set summarized here are identified in Attachment A. Arsenic, barium, cadmium, chromium, copper, lead, nickel, selenium, silver and zinc were all below their respective analytical limits of detection.

(2) The concentration of the analyte used for the initial COPEC screening is the maximum detected concentration.

(3) The surface water benchmarks selected are the National Recommended Water Quality Criteria for mercury and the OSWER Tier II Secondary Surface Water Screening Value for barium.

(4) Analyte is selected as a COPEC if the concentration used for screening (the maximum detected concentration) exceeds the Ecological Surface Water Screening Levels, or if no screening value is available.

Rationale:

BSL - below screening level. The maximum detected concentration is less than the screening toxicity value; the analyte was not selected as a COPEC.

ASL - above screening level. The maximum detected concentration is greater than the screening toxicity value; the analyte was selected as a COPEC.

mg/L : Milligrams per liter.

COPEC : Chemical of potential concern.

NA : Not applicable or not available.

TABLE IV
COPEC SCREENING - METALS IN SEDIMENT
RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE
FORMER UNITED SHOE MACHINERY (USM) FACILITY
BEVERLY, MASSACHUSETTS
FILE NO. 37713-002

Analyte	CAS No.	Frequency of Detection ⁽¹⁾	Range of Detected Concentrations (mg/kg) ^(1, 2)	Location of Maximum Detected Concentration ⁽¹⁾	Ecological Screening Levels (mg/kg) ⁽³⁾	Parameter Selected as COPEC ⁽⁴⁾	
Arsenic	7440-38-2	24 / 24	100%	16.8 - 39.5	S2A1-102617-0915	70	No BSL
Barium	7440-47-3	24 / 24	100%	35.9 - 112	BS1B-102617-1215	NA	YES NSL
Cadmium	7440-43-9	23 / 24	96%	0.3781 - 2.999	S3B1-102617-1105	9.6	No BSL
Chromium	7440-47-3	24 / 24	100%	144 - 1280	R4B1-102717-0910	370	YES ASL
Copper	7440-50-8	24 / 24	100%	70.2 - 1360	S4A1-102617-0001	270	YES ASL
Lead	7439-92-1	24 / 24	100%	132 - 819	BS1A-102617-1335	218	YES ASL
Mercury	7439-97-6	24 / 24	100%	0.286 - 2.3	S1B1-102617-0945	0.71	YES ASL
Nickel	7440-02-0	24 / 24	100%	20.9 - 297	BS1A-102617-1335	51.6	YES ASL
Selenium	7782-49-2	8 / 24	33%	4.51 - 7.45	R4A1-102717-0850	NA	YES NSL
Silver	7440-22-4	20 / 24	83%	0.779 - 4.03	S4C1-102617-1025	3.7	YES ASL
Zinc	7440-66-6	24 / 24	100%	189 - 498	BS1A-102617-0002	410	YES ASL

Notes and Abbreviations:

- (1) The sediment samples included in this data set summarized here are identified in Attachment A.
- (2) The concentration of the analyte used for the initial COPEC screening is the maximum detected concentration.
- (3) Ecological Screening Levels selected are the NOAA Effects Range - Median marine sediment screening benchmarks (MacDonald et al., 2000).
- (4) Scientific management decision screening criteria to determine if the COPEC maximum exceeds the NOAA ERM Screening Benchmark, or if no screening value is available:

Rationale:

- BSL - below screening level. The maximum detected concentration is less than the screening toxicity value.
- ASL - above screening level. The maximum detected concentration is greater than the screening toxicity value.
- NSL - no screening level. No screening level is available, therefore the analyte was retained as a COPEC.

mg/Kg : Milligrams per kilogram.

COPEC : Chemical of potential concern.

NA : Not applicable or not available.

TABLE V

DESCRIPTIVE STATISTICS FOR SEDIMENT DATA - REFERENCE AREA, SITE AND YACHT CLUB

RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE

FORMER UNITED SHOE MACHINERY (USM) FACILITY

BEVERLY, MASSACHUSETTS

FILE NO. 37713-002

Analyte	Reach	Count	Minimum	Maximum	Mean	Standard Deviation	Coefficient of Variation	Normal Distribution?
Arsenic	Reference	8	18.9	32.0	23.8	4.2	0.18	YES
	Site	12	18.0	39.5	29.1	5.9	0.20	YES
	Yacht Club	2	18.8	34.8	26.8	11.3	0.42	YES
Barium	Reference	8	47.2	105.0	78.8	19.1	0.24	YES
	Site	12	35.9	108.0	76.4	26.6	0.35	YES
	Yacht Club	2	71.0	112.0	91.5	29.0	0.32	YES
Cadmium	Reference	8	0.8	2.6	1.8	0.5	0.30	YES
	Site	11	0.5	3.0	1.9	0.9	0.49	YES
	Yacht Club	2	0.4	1.4	0.9	0.7	0.78	YES
Chromium	Reference	8	362.0	1280.0	833.8	270.8	0.32	YES
	Site	12	144.0	1190.0	734.8	396.6	0.54	YES
	Yacht Club	2	343.0	538.0	440.5	137.9	0.31	YES
Copper	Reference	8	70.2	150.0	113.4	24.7	0.22	YES
	Site	12	121.0	1210.0	295.8	354.4	1.20	NO
	Yacht Club	2	150.0	467.5	308.8	224.5	0.73	YES
Lead	Reference	8	132.0	332.0	223.0	60.5	0.27	YES
	Site	12	237.0	622.0	332.3	102.1	0.31	NO
	Yacht Club	2	232.0	798.0	515.0	400.2	0.78	YES
Mercury	Reference	8	1.0	1.9	1.4	0.4	0.24	YES
	Site	12	0.3	2.3	1.3	0.7	0.55	YES
	Yacht Club	2	0.8	1.7	1.3	0.6	0.47	YES
Nickel	Reference	8	20.9	36.3	28.2	4.9	0.17	YES
	Site	12	27.3	47.0	35.2	5.7	0.16	YES
	Yacht Club	2	39.6	292.5	166.1	178.8	1.08	YES
Selenium	Reference	8	4.5	7.5	5.9	0.9	0.15	YES
	Site	0	--	--	ND	--	--	YES
	Yacht Club	0	--	--	ND	--	--	YES
Silver	Reference	8	0.8	3.0	2.0	0.6	0.33	YES
	Site	11	0.8	4.0	2.6	1.2	0.46	YES
	Yacht Club	0	--	--	ND	--	--	YES
Zinc	Reference	8	189.0	356.0	276.5	57.0	0.21	YES
	Site	12	265.0	341.0	313.9	24.5	0.08	YES
	Yacht Club	2	271.0	480.5	375.8	148.1	0.39	YES
TOC	Reference	8	3.2	5.4	4.2	0.9	0.20	YES
	Site	12	2.1	5.9	4.0	1.3	0.32	YES
	Yacht Club	2	3.9	4.9	4.4	0.7	0.17	YES
Percent Solid	Reference	8	40.2	60.6	46.1	6.3	0.14	YES
	Site	12	44.4	69.0	54.5	8.5	0.16	YES
	Yacht Club	2	42.7	65.8	54.2	16.3	0.30	YES

NOTE: Statistics calculated using NCSS Software (NCSS 8. NCSS, LLC. Kaysville, Utah, USA. www.ncss.com. - Version 8.0.12). Normality tests included Shapiro-Wilk W, Anderson-Darling, Martinez-Iglewicz, Kolmogorov-Smirnov and D'Agostino Skewness, D'Agostino Kurtosis, D'Agostino Omnibus. Results for normality are presented in Attachment I under "Normality Test Results" for each individual metal.

TABLE VI**MEANS DIFFERENCES FOR SEDIMENT DATA - REFERENCE AREA, SITE AND YACHT CLUB****RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE****FORMER UNITED SHOE MACHINERY (USM) FACILITY****BEVERLY, MASSACHUSETTS****FILE NO. 37713-051**

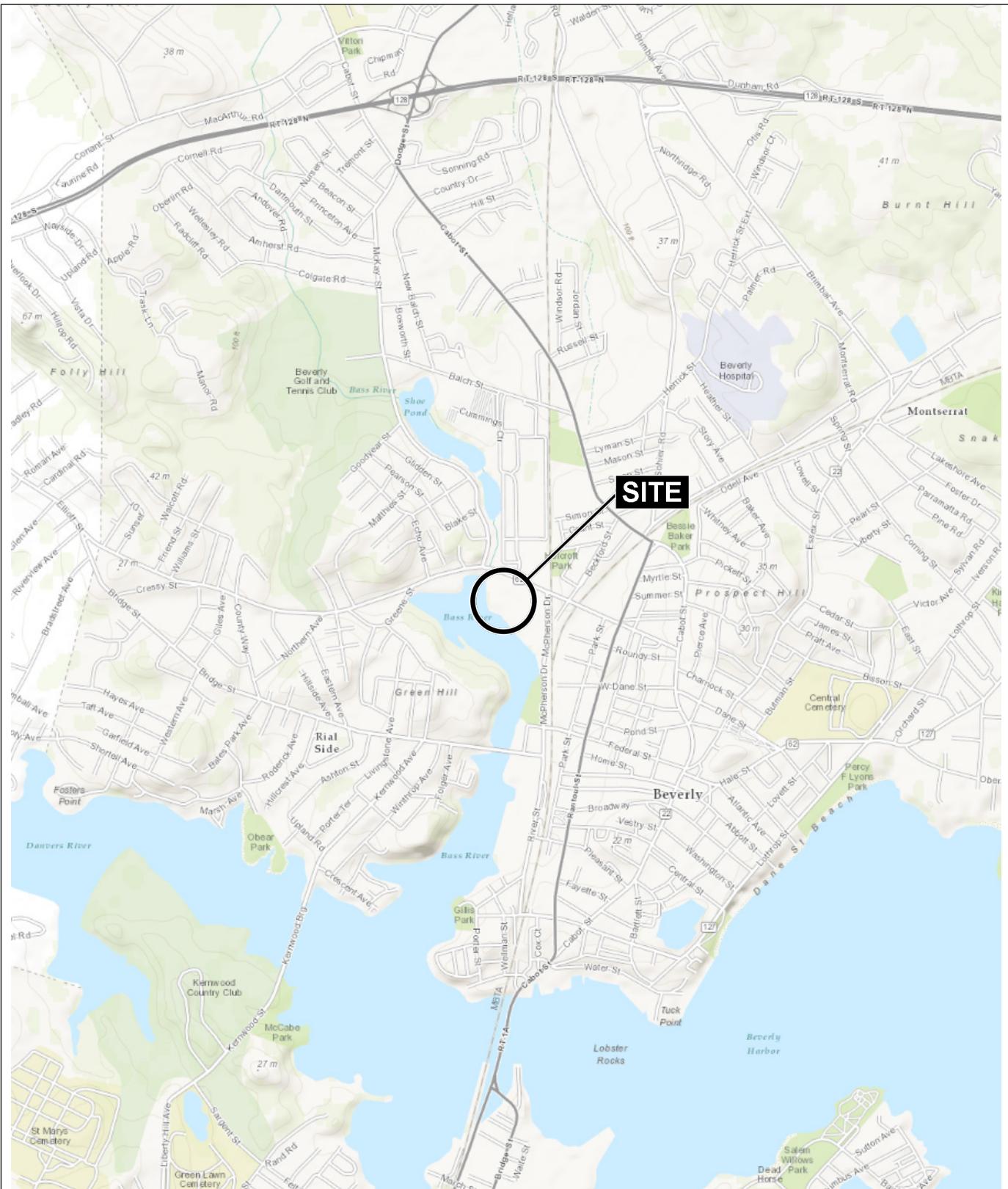
Analyte	Reference Mean Different from Site Mean?	Reference Mean Different from Yacht Club Mean?	Site Mean Different from Yacht Club Mean?
Arsenic	No	No	No
Barium	No	No	No
Cadmium	No	No	No
Chromium	No	No	No
Copper	No	No	No
Lead	No	Yes	Yes
Mercury	No	No	No
Nickel	No	No	No
Selenium	(a)	(a)	(a)
Silver	No	No	No
Zinc	No	Yes	Yes

Note: Statistics calculated using NCSS Software (NCSS 8. NCSS, LLC. Kaysville, Utah, USA. www.ncss.com. - Version 8.0.12). All statistical tests run using a significance level of p = 0.05. Means for metals that were normally distributed (all but copper and lead) were tested using ANOVA multiple comparison tests including Tukey Kramer Test, Fisher's LSD Test, Bonferroni's Test and Sheffe's Test (see Attachment B-2). For copper and lead, which were not normally distributed, the statistical evaluations used nonparametric tests: Mann Whitney U Test and the Kruskal Wallis Test (see Attachment B-3).

(a): Selenium was not detected in sediment samples obtained from both the Site Area and the Bass River Yacht Club.

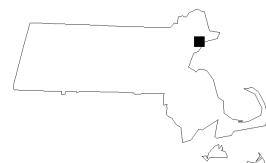
FIGURES

Draft



MAP SOURCE: ESRI

SITE COORDINATES: 42°33'19"N, 70°53'15"W



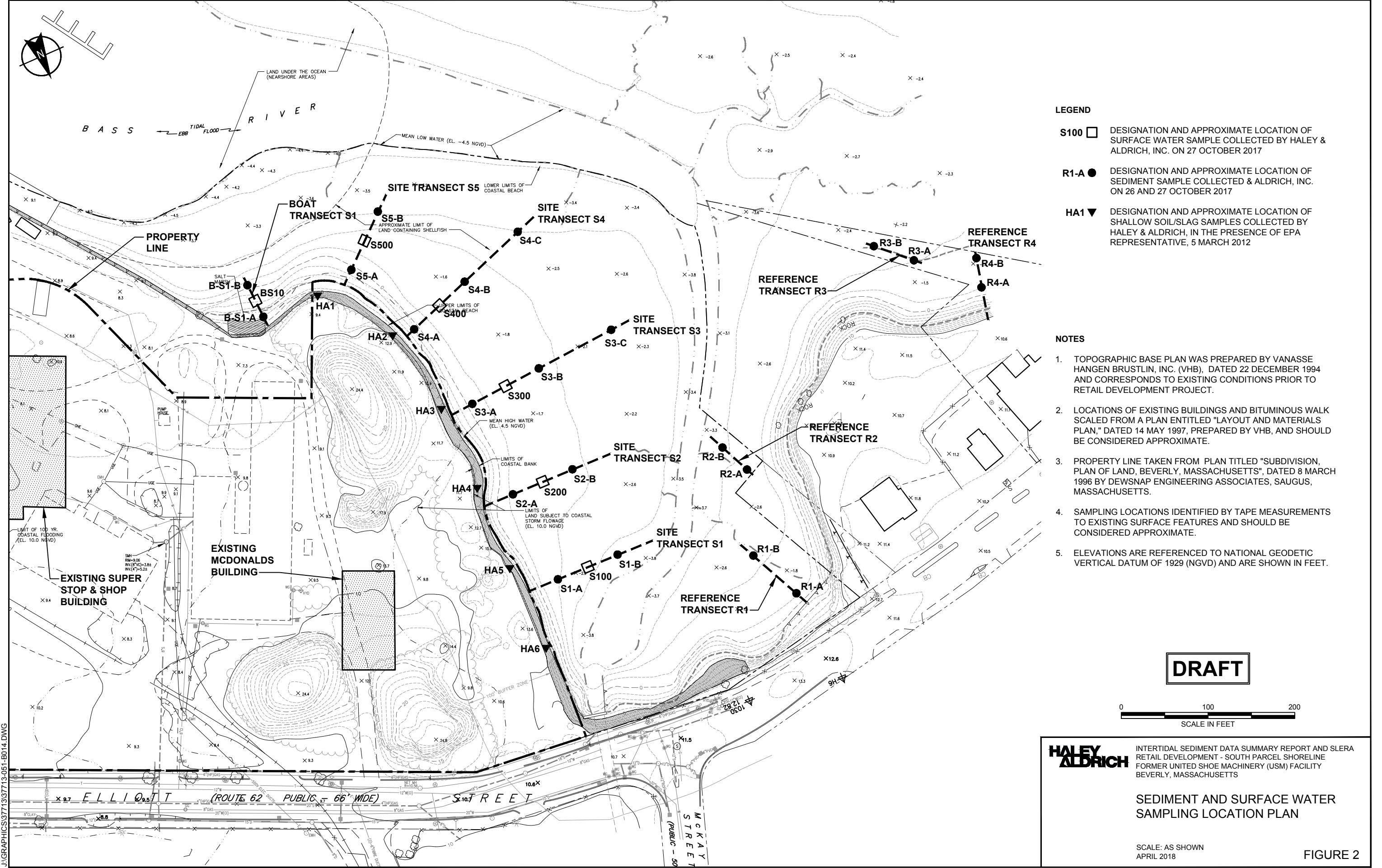
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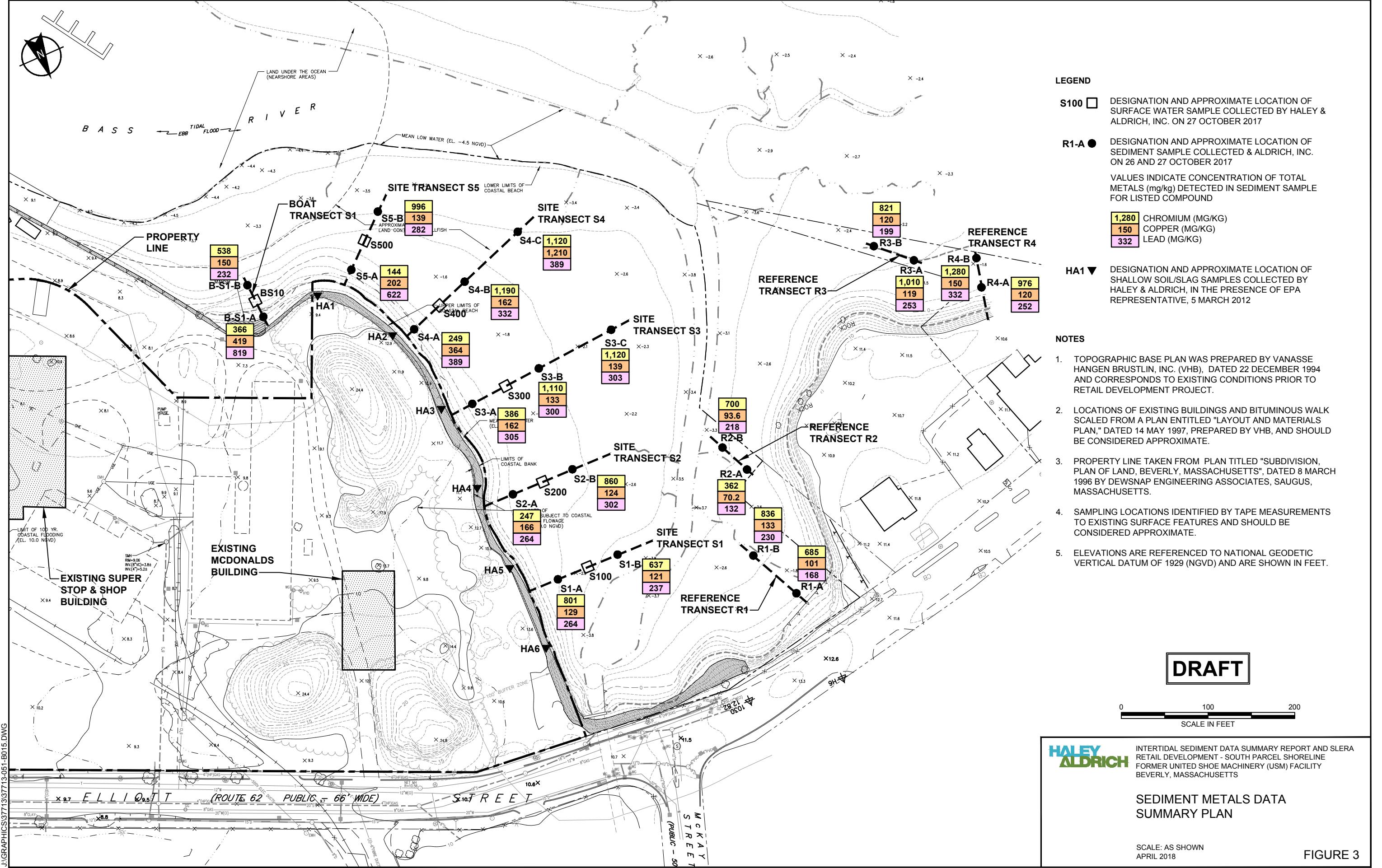
INTERTIDAL SEDIMENT DATA SUMMARY REPORT AND SLERA
RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE
FORMER UNITED SHOE MACHINERY (USM) FACILITY
BEVERLY, MASSACHUSETTS

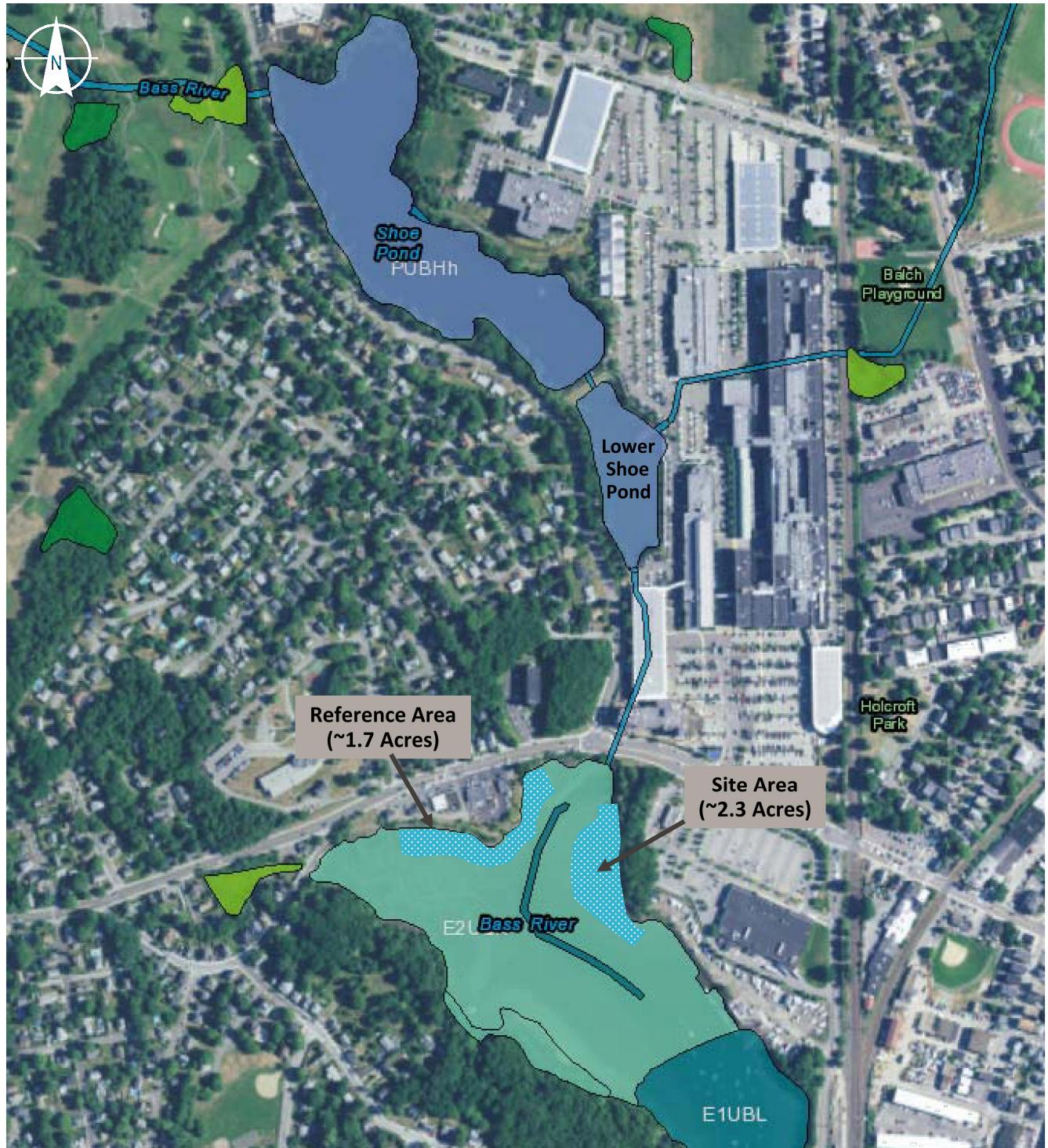
SITE LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
APRIL 2018

FIGURE 1







DRAFT

NOTES

- SOURCE: USF&W WETLAND MAPPER:
[HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML](https://www.fws.gov/wetlands/data/mapper.html).
- SHOE PONDS CLASSIFIED AS PUBHH (SMALL MAN-MADE, PERMANENTLY FLOODED FRESHWATER PONDS).
- BASS RIVER SHORELINE ADJACENT TO THE SOUTH PARCEL CATEGORIZED AS E2UUSN (BRACKISH ESTUARY "TIDAL FLATS").

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INTERTIDAL SEDIMENT DATA SUMMARY REPORT AND SLERA
RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE
FORMER UNITED SHOE MACHINERY (USM) FACILITY
BEVERLY, MASSACHUSETTS

WETLANDS CLASSIFICATIONS -
SHOE PONDS AND BASS RIVER
EMBAYMENT

SCALE: NONE
APRIL 2018

FIGURE 4

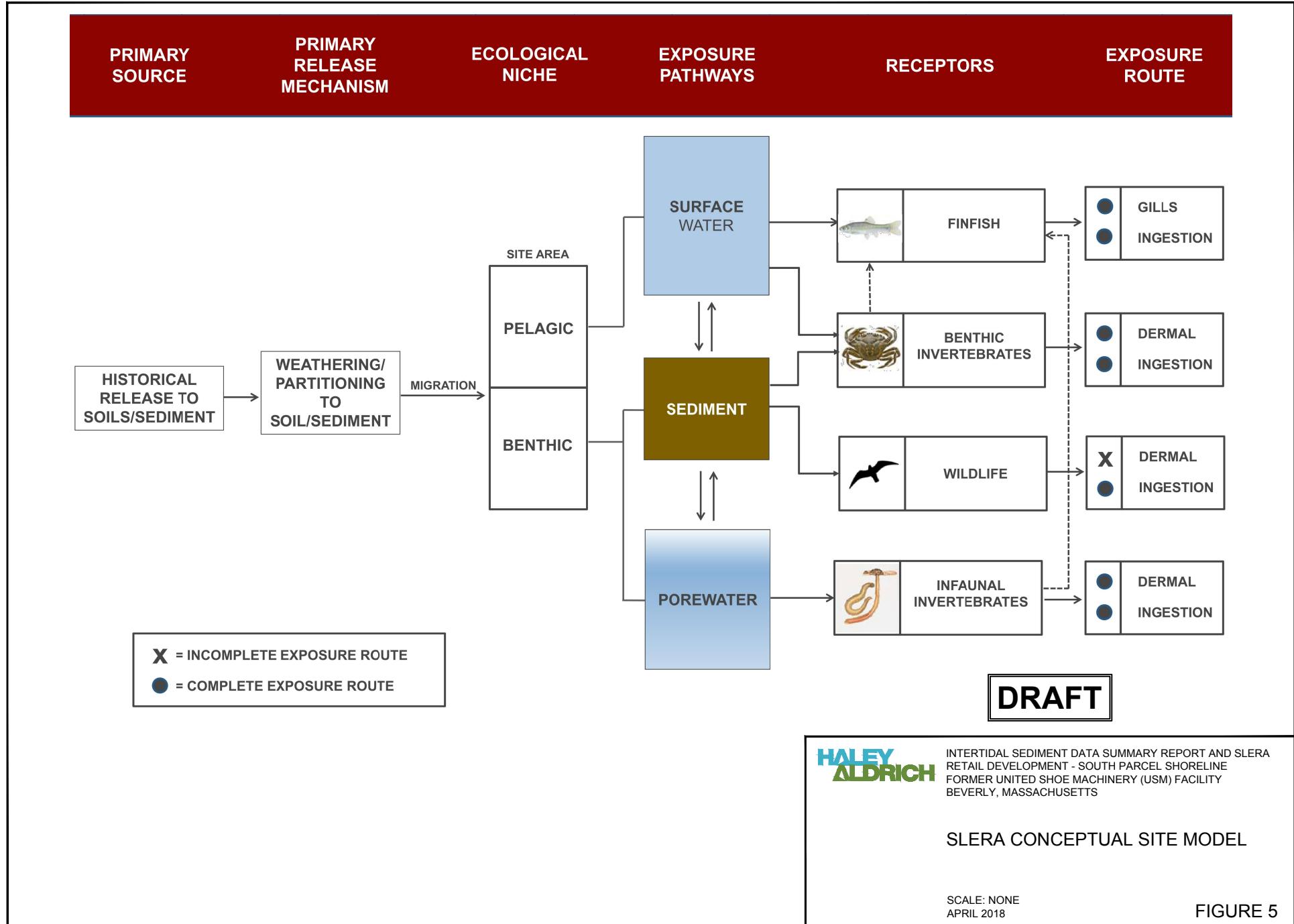
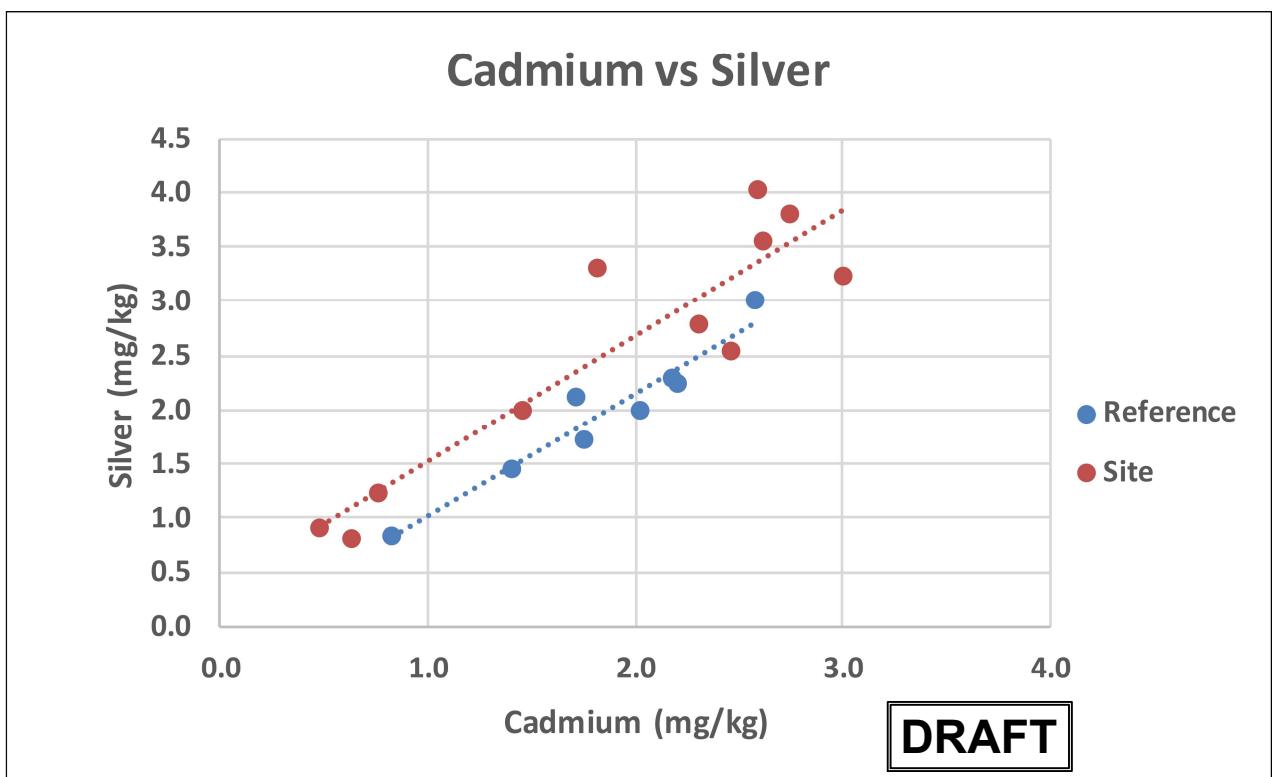
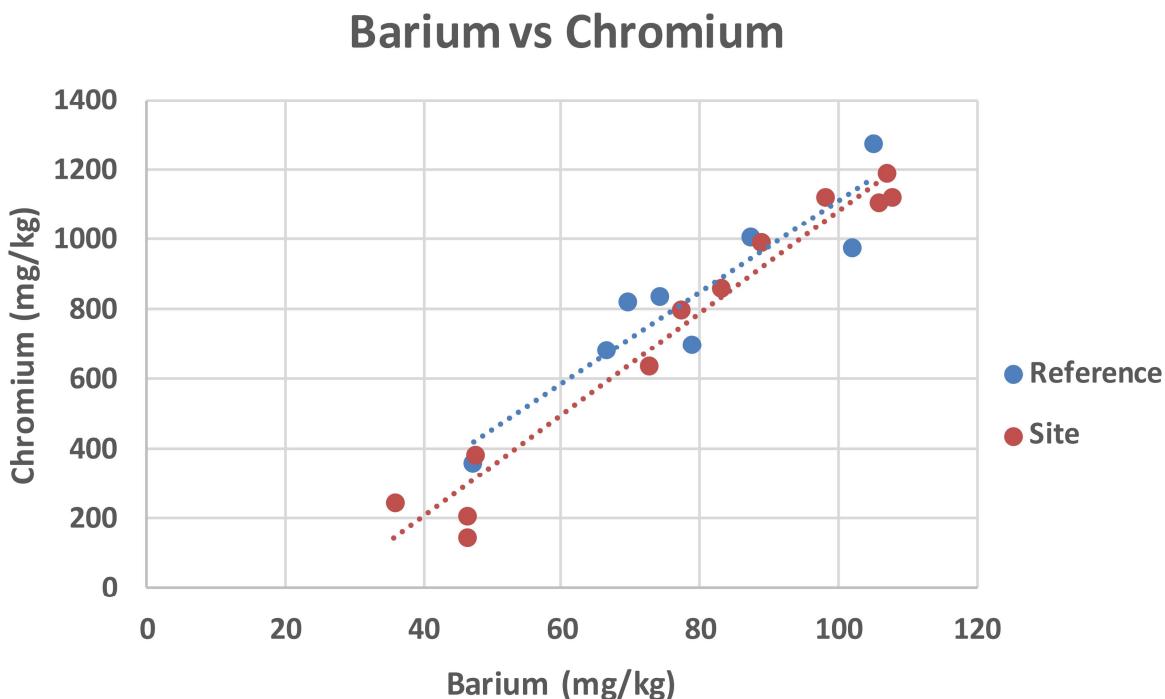


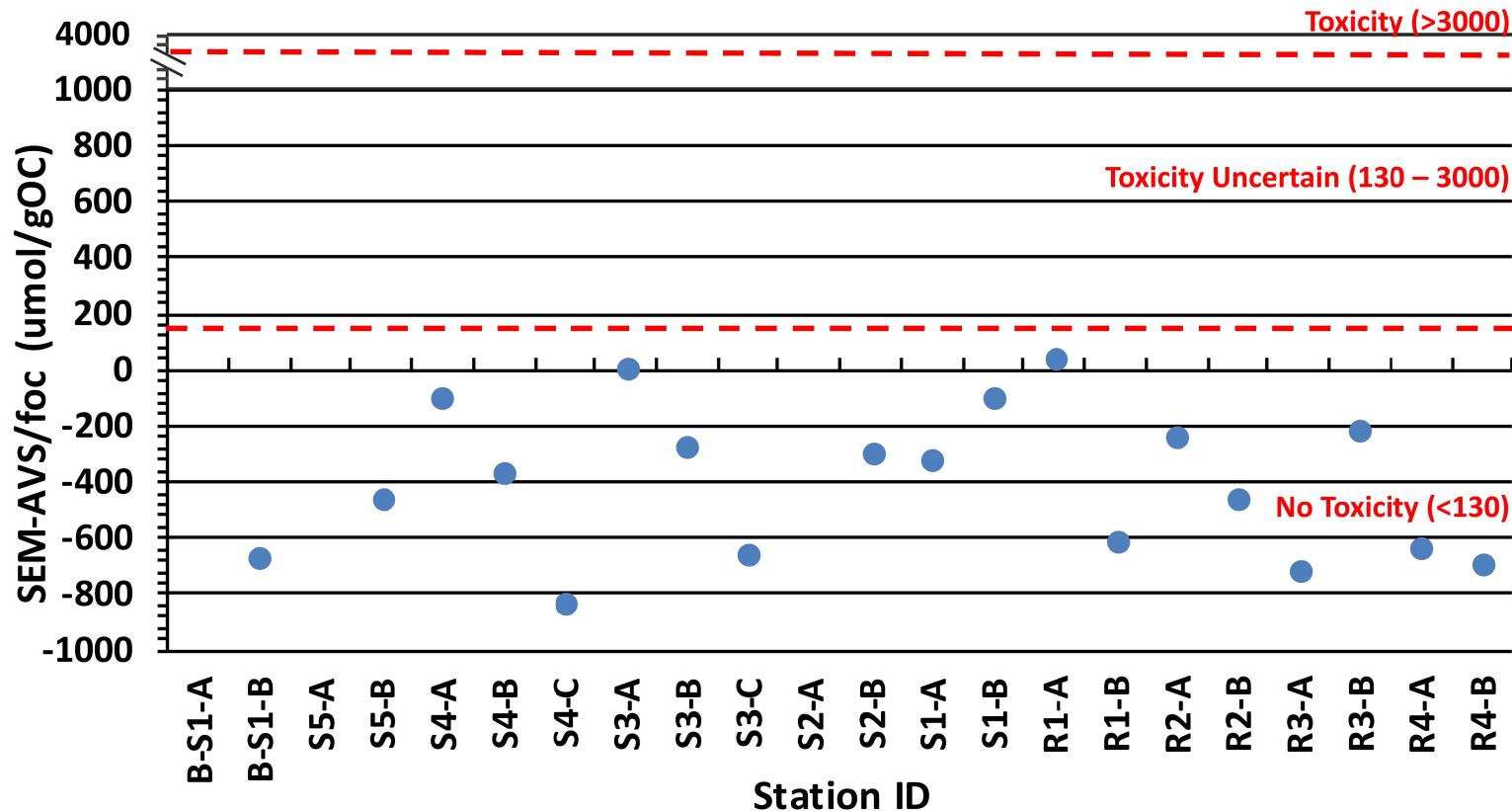
FIGURE 5



NOTES

1. DATA POINTS CORRESPOND TO SEDIMENT SAMPLES FROM THE REFERENCE AREA (BLUE) AND THE SITE AREA (RED).
2. OVERLAPPING METALS DISTRIBUTIONS AND NO OBVIOUS STATISTICAL DIFFERENCE BETWEEN THE SLOPES OF THE TWO LINES INDICATE THE SOURCE OF THESE METALS WAS DIFFERENT FROM THE APPARENT SLAG IN FILL MATERIALS ALONG THE SOUTH PARCEL SHORELINE.

SEM-AVS/foc Values for Sediments



NOTES

1. USEPA EQUILIBRIUM SEDIMENT BENCHMARKS (1998) INDICATE TOXICITY AS FOLLOWS:
 - LIKELY WHEN THE $(\sum \text{SEM-AVS})/\text{fOC}$ is $>3,000 \mu\text{mol/gOC}$,
 - UNCERTAIN WHEN THE CONCENTRATION IS BETWEEN 130 AND $3,000 \mu\text{mol/gOC}$,
 - NOT LIKELY WHEN THE CONCENTRATION IS $<130 \mu\text{mol/gOC}$.
2. STATIONS WITH MEASURED SULFIDE LEVELS WERE BELOW $130 \mu\text{mole/gOC}$.

DRAFT

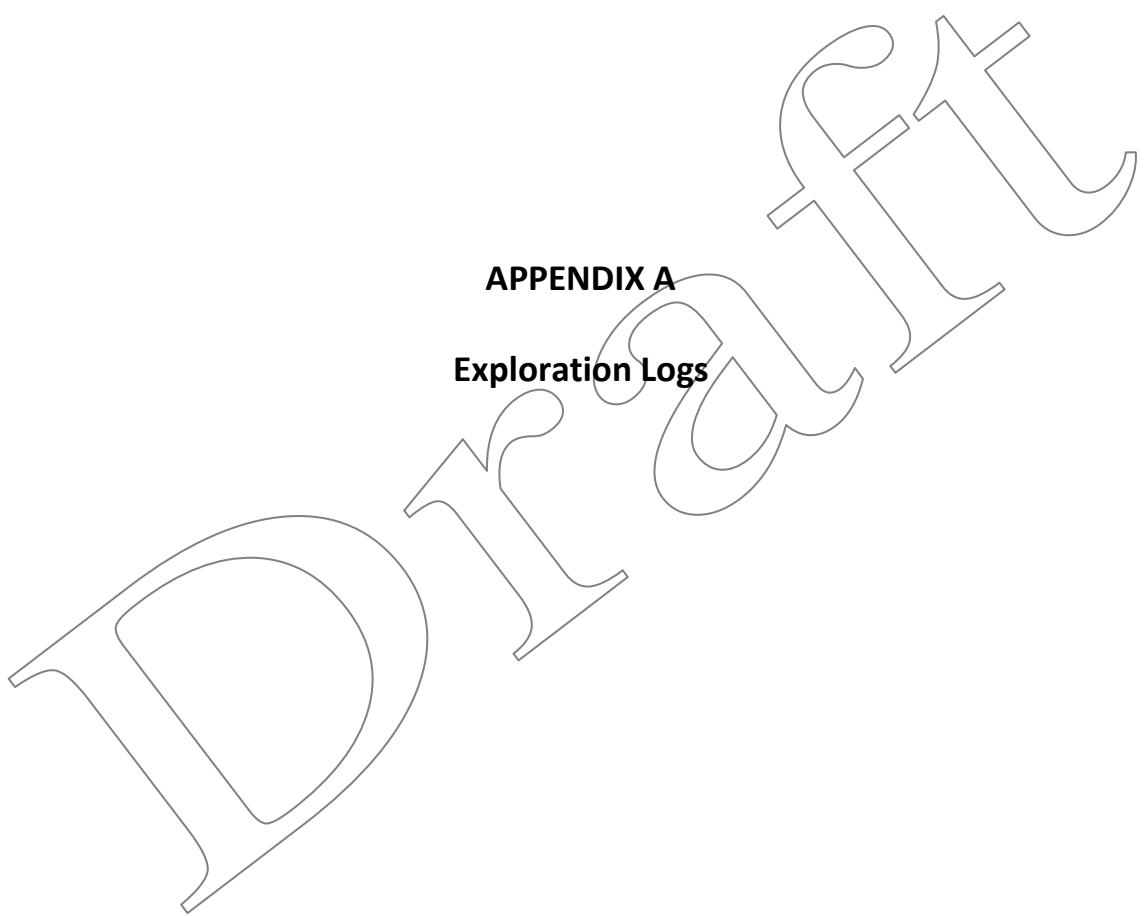


INTERTIDAL SEDIMENT DATA SUMMARY REPORT AND SLERA RETAIL DEVELOPMENT - SOUTH PARCEL SHORELINE FORMER UNITED SHOE MACHINERY (USM) FACILITY BEVERLY, MASSACHUSETTS

SEM-AVS/FOC VALUES FOR SEDIMENTS

SCALE: NONE
APRIL 2018

FIGURE 7



SAMPLE IDENTIFICATION KEY

Project:	Beverly Former USM	Client:	Stop & Shop Supermarkets						File Number:	37713-					
Location:	Beverly, MA	Weather:							Project Manager:	J. Sweet					
Investigation Area:		Units:	ft						Field Representative:	S.Clough					
Sampling Company:	HAI	Notes:							Field Representative Signature:						
Laboratory:	Alpha Analytical								Date						
	Sample ID	Parent Sample ID	Location ID	Sample Date	Sample Time (military)	Sample Type Code	Matrix Code	Filtered (Water Only) (T/D/N)	Composite (Y/N)	Soil Type	Depth to Top (ft)	Depth to Bottom (ft)	Chain of Custody Number	Comments	Collected By
	S2A1-102617-0915		S2A1	10/26/17	0915				Y	Sed.	0.0	0.5			CRS
	S1A1-102617-0930		S1A1	10/26/17	0930				Y		0.0	0.5			CRS
	S1B1-102617-0945		S1B1	10/26/17	0945				Y		0.0	0.5			CRS
	S3C1-102617-1010		S3C1	10/26/17	1010				Y		0.0	0.5			CRS
	S4C1-102617-1025		S4C1	10/26/17	1025				Y		0.0	0.5			CRS
	S2B1-102617-1050		S2B1	10/26/17	1050				Y		0.0	0.5			CRS
	S3B1-102617-1110	3	S3B1	10/26/17	1110				Y		0.0	0.5			CRS
	S5B1-102617-1125		S5B1	10/26/17	1125				Y		0.0	0.5			CRS
	S4B1-102617-1135		S4B1	10/26/17	1135				Y		0.0	0.5			CRS
	S3A1-102617-1150		S3A1	10/26/17	1150				Y		0.0	0.5			CRS
	S5A1-102617-1205		S5A1	10/26/17	1205				Y		0.0	0.5			CRS
	BS1B-102617-1215		BS1B	10/26/17	1215				Y		0.0	0.5			CRS
	S4A1-102617-1310		S4A1	10/26/17	1310				Y		0.0	0.5			CRS
	BS1A-102617-1335		BS1A	10/26/17	1335				Y		0.0	0.5			CRS
	S5A1-102617-MSD		S5A1	10/26/17	1205				Y		0.0	0.5			CRS
	S5A1-102617-MS		S5A1	10/26/17	1205				Y		0.0	0.5			CRS
	S4A1-102617-0001		S4A1	10/26/17	1310				Y		0.0	0.5			CRS
	BS1A-102617-0002		BS1A	10/26/17	1335				Y		0.0	0.5			CRS
				10/ /17					Y		0.0	0.5			CRS
				10/ /17					Y		0.0	0.5			CRS

SAMPLE IDENTIFICATION KEY

Project:	Beverly Former USM	Client:	Stop & Shop Supermarkets						File Number:	37713-				
Location:	Beverly, MA	Weather:							Project Manager:	J. Sweet				
Investigation Area:		Units:	ft						Field Representative:	S.Clough				
Sampling Company:	HAI	Notes:							Field Representative Signature:					
Laboratory:	Alpha Analytical											Date		
Sample ID	Parent Sample ID	Location ID	Sample Date	Sample Time (military)	Sample Type Code	Matrix Code	Filtered (Water Only) (T/D/N)	Composite (Y/N)	Soil Type	Depth to Top (ft)	Depth to Bottom (ft)	Chain of Custody Number	Comments	Collected By
R4A1-102717-0850		R4A1	10/27/17	0850				Y	Sed.	0.0	0.5			CRS
R4A1+102717- MS		R4A1	10/27/17	0850				Y		0.0	0.5			CRS
R4A1-102717-M5D		R4A1	10/27/17	0850				Y		0.0	0.5			CRS
R4B1-102717-0910		R4B1	10/27/17	0910				Y		0.0	0.5			CRS
R1A1-102717-1100		R1A1	10/27/17	1100				Y		0.0	0.5			CRS
R1B1-102717-1020		R1B1	10/27/17	1020				Y		0.0	0.5			CRS
R2A1-102717-1040		R2A1	10/27/17	1040				Y		0.0	0.5			CRS
R2B1-102717-1120		R2B1	10/27/17	1120				Y		0.0	0.5			CRS
R3A1-102717-0930		R3A1	10/27/17	0930				Y		0.0	0.5			CRS
R3B1-102717-0945		R3B1	10/27/17	0945				Y		0.0	0.5			CRS
S100 -102717-1325		S100	10/27/17	1325				Y	SW	0.0	0.5			CRS
S200 -102717-1346		S200	10/27/17	1346				Y		0.0	0.5			CRS
S300 -102717-1400		S300	10/27/17	1400				Y		0.0	0.5			CRS
S400 -102717-1420		S400	10/27/17	1420				Y		0.0	0.5			CRS
S500 -102717-1430		S500	10/27/17	1430				Y		0.0	0.5			CRS
BS10 -102717-1450		BS10	10/27/17	1450				Y		0.0	0.5			CRS
			10/ /17					Y		0.0	0.5			CRS
			10/ /17					Y		0.0	0.5			CRS
			10/ /17					Y		0.0	0.5			CRS
			10/ /17					Y		0.0	0.5			CRS

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SAMPLING RECORD

Page 1 of 3

PROJECT	BEVERLY FORMER USM	H&A FILE NO.	37713-
LOCATION	BEVERLY, MA	PROJECT MGR.	J. SWEET
CLIENT		FIELD REP.	S. CLOUGH
CONTRACTOR		DATE	10/26/17

Weather	Rainy 62	Temperature	
Ground surface Conditions	<input type="checkbox"/> Dry <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Damp <input checked="" type="checkbox"/> Standing Water	<input type="checkbox"/> Snow (in)	<input type="checkbox"/> Other
Comments			

SURFACE WATER SAMPLING INFORMATION

Sample No.	Location	Depth (ft)	Time	Sample Description	Sampling Device	Cleaning Procedure	Container Type
S2A1		0 - 0.5	0915	Gray / Black, organic SILT or/oh, no structure, H ₂ S odor, wet, slugs throughout, shells, sea worms	trowel	AIX/AIC	
S1A1		0 - 0.5	0930	Black organic SILT with sand and gravel, O/L/OH, no structure, H ₂ S odor, wet, slugs throughout, shells	texan	AIX/AIC	
S1B1		0 - 0.5	0945	Black organic silt or/oh, no structure, H ₂ S odor, wet, shells, trace slugs	texan	AIX/AIC	
S3C1		0 - 0.5	1010	Black organic SILT or/oh, no structure, H ₂ S odor, wet, shells	texan	AIX/AIC	
S4C1		0 - 0.5	1025	Black organic SILT or/oh, no structure, H ₂ S odor, wet, shells	texan	AIX/AIC	
S2B1		0 - 0.5	1050	Black organic silt with sand and gravel or/oh, no structure, H ₂ S odor, wet, shells, trace slugs	texan	AIX/AIC	
S3B1		0 - 0.5	1110	Black organic silt with sand and gravel or/oh, no structure, H ₂ S odor, wet, shells, trace slugs	texan	AIX/AIC	
S5B1		0 - 0.5	1125	Black organic silt with sand and gravel or/oh, no structure, H ₂ S odor, wet, shells, trace slugs, sea worms	texan	AIX/AIC	
S4B1		1135		Black organic silt with sand and gravel or/oh, no structure, H ₂ S odor, wet, shells, trace slugs	texan	AIX/AIC	
S3A1		1150		Red Brown/Black sandy organic SILT with gravel or/oh, no structure, organic odor, wet shells, slugs throughout	trowel	AIX/AIC	
S5A1		1205		Brown silty SAND with gravel or/oh, no structure, organic odor, shells, slugs throughout	trowel	AIX/AIC	

General Comments: (ie: field filtrations, persons communicated with at site, etc.)

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SAMPLING RECORD

Page 2 of 3

PROJECT	BEVERLY FORMER USM	H&A FILE NO.	37713-	
LOCATION	BEVERLY, MA	PROJECT MGR.	J. SWEET	
CLIENT		FIELD REP.	S. CLOUGH C, Sm, M	
CONTRACTOR		DATE	10/26/17	
Weather	Rainy	Temperature	60	
Ground surface Conditions	<input type="checkbox"/> Dry	<input checked="" type="checkbox"/> Wet	<input type="checkbox"/> Damp	<input checked="" type="checkbox"/> Standing Water
Comments	<input type="checkbox"/> Snow (____in) <input type="checkbox"/> Other _____			

SURFACE WATER SAMPLING INFORMATION

General Comments: (ie: field filtrations, persons communicated with at site, etc.)

**HALEY &
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SAMPLING RECORD

Page of

PROJECT	BEVERLY FORMER USM	H&A FILE NO.	37713-
LOCATION	BEVERLY, MA	PROJECT MGR.	J. SWEET
CLIENT		FIELD REP.	S. CLOUGH
CONTRACTOR		DATE	10/27/17
Weather		Temperature	
Ground surface Conditions		<input type="checkbox"/> Dry	<input type="checkbox"/> Wet
		<input type="checkbox"/> Damp	<input checked="" type="checkbox"/> Standing Water
Comments		<input type="checkbox"/> Snow (____in) <input type="checkbox"/> Other _____	

SURFACE WATER SAMPLING INFORMATION

General Comments: (ie: field filtrations, persons communicated with at site, etc.)

HALEY ALDRICH

Pond Surface Water Sampling Data Sheet

Project BEVERLY FORMER USM
 Location BEVERLY, MA
 Weather sunny

File No. 37713-
 Date 10/27/17
 Field Rep. S. Clough / C. Smith

Sample Location S100 Sample ID S100 - 102717-1325 (S.R.C.)
 Sample Depth 17" Pond Depth 34"
 Sampling Device Bottle Monitoring Device YSI
 Time 13:05 (S.R.C.)
 Secci Depth

Temp, C 16.07°C
 SpC (uS/cm) 39811
 Cond. (uS/cm) 33017
 pH 7.90
 ORP (mV) 163.7
 Turbidity (NTU) 13.3
 DO (mg/L) 7.12
 DO (%)

SECCI DEPTH (if applies)

NOTES:

Sampled with dedicated bottle
 then pumped through filter for sample.
Incoming Tide

FLOC LAYER

POND BED

LOCATION ID:

Sample Location S200 Sample ID S200 - 102717-1400 1346
 Sample Depth 14" Pond Depth 28" Time 14:00
 Sampling Device Bottle Monitoring Device YSI Secci Depth —

Temp, C 16.34
 SpC (uS/cm) 38682
 Cond. (uS/cm) 32330
 pH 7.90
 ORP (mV) 173.5
 Turbidity (NTU) 23.2
 DO (mg/L) 7.60
 DO (%)

SECCI DEPTH (if applies)

NOTES:

See S100 note

FLOC LAYER

POND BED

LOCATION ID:

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Pond Surface Water Sampling Data Sheet

Project	BEVERLY FORMER USM	File No.	37713-
Location	BEVERLY, MA	Date	10/27/17
Weather	Sunny	Field Rep.	S. Clough /C. Smith

Sample Location	S 300	Sample ID	S 300 - 102717-1400	Time	1400
Sample Depth	13"	Pond Depth	27"	Secci Depth	
Sampling Device	Bottles	Monitoring Device	YSI		
Temp, C	16.89				
SpC (uS/cm)	400/4				
Cond. (uS/cm)	33812				
pH	7.98				
ORP (mV)	164.2				
Turbidity (NTU)	15.8				
DO (mg/L)	8.70				
DO (%)					
NOTES:	See S100 note				
				FLOC LAYER	
				POND BED	
				LOCATION ID:	

Sample Location	S 400	Sample ID	S 400 - 102717-1420	Time	1420
Sample Depth	15"	Pond Depth	30"	Secci Depth	—
Sampling Device	Bottles	Monitoring Device	YSI		
Temp, C	16.3				
SpC (uS/cm)	40131				
Cond. (uS/cm)	33475				
pH	8.03				
ORP (mV)	165.9				
Turbidity (NTU)	9.03				
DO (mg/L)	8.39				
DO (%)					
NOTES:	See S100 note				
				FLOC LAYER	
				POND BED	
				LOCATION ID:	

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Pond Surface Water Sampling Data Sheet

Project	<u>BEVERLY FORMER USM</u>			File No.	<u>37713-</u>
Location	<u>BEVERLY, MA</u>			Date	
Weather				Field Rep.	<u>S. Clough</u>
Sample Location	<u>S 500</u>	Sample ID	<u>S 500 - 102717 - 1430</u>		
Sample Depth	<u>20 "</u>	Pond Depth	<u>39 "</u>		
Sampling Device	<u>Bottle</u>	Monitoring Device	<u>YSI</u>		
Temp, C	<u>15.35</u>			Time	<u>1430</u>
SpC (uS/cm)	<u>41678</u>			Secci Depth	<u>—</u>
Cond. (uS/cm)	<u>33509</u>				
pH	<u>7.98</u>				
ORP (mV)	<u>163.1</u>			SECCI DEPTH (if applies)	
Turbidity (NTU)	<u>8.0</u>				
DO (mg/L)	<u>6.80</u>				
DO (%)					
NOTES:	<u>See S100 notes</u>			FLOC LAYER	
				POND BED	
LOCATION ID:					
Sample Location	<u>B510</u>	Sample ID	<u>B510 - 102717 - 1450</u>		
Sample Depth	<u>6 "</u>	Pond Depth	<u>12 "</u>		
Sampling Device		Monitoring Device	<u>YSI</u>		
Temp, C	<u>16.38</u>			Time	<u>1450</u>
SpC (uS/cm)	<u>34110</u>			Secci Depth	<u>—</u>
Cond. (uS/cm)	<u>28220</u>				
pH	<u>8.21</u>				
ORP (mV)	<u>152.2</u>			SECCI DEPTH (if applies)	
Turbidity (NTU)	<u>9.62</u>				
DO (mg/L)	<u>8.40</u>				
DO (%)					
NOTES:	<u>See S100 notes.</u>			FLOC LAYER	
				POND BED	
LOCATION ID:					

HALEY ALDRICH

Instrument Calibration Log

Project	BEVERLY FORMER USM	File No.	37713-
Location	BEVERLY, MA	Date	10/27/17
Contractor		Field Rep.	S. CLOUGH
Weather	Sunny	Outdoor Temp	65

Equipment ID YSI 556 vs Environmental rental
 Time Calibration Started: 1150 Time Calibration Completed: 1231

Dissolved Oxygen (100%)

Reading Before Calibration: 102.0
 Barometric Pressure: 761.3
 Temperature (C°) 12.76
 Reading after calibration: 100.2

Probe Type (Check One)

Membrane Optical

pH 7

Reading Before Calibration: 7.10
 Calibration Value: 7.03
 Temperature (C°) 12.06
 Lot/Expiration: 76-6600
 Reading After Calibration: 7.04

pH 10

Reading Before Calibration: 9.89
 Calibration Value: 10.18
 Temperature (C°) 12.28
 Lot/Expiration: 61-6873 07/18
 Reading After Calibration: 10.13

pH 4

Reading Before Calibration: 3.81
 Calibration Value: 4.00
 Temperature (C°) 12.14
 Lot/Expiration: 666889 07/18
 Reading After Calibration: 4.00

Specific Conductance/ Conductivity

Reading Before Calibration: 1038
 Calibration Value: 100.0
 Temperature (C°) 12.45
 Lot/Expiration: 765520 10/18
 Reading After Calibration: 100.0

ORP Standard 160 (mv) at 25°C

Reading Before Calibration: 128.2
 Calibration Value: 120.0
 Temperature (C°) 13.71
 Lot/Expiration: 765521 12.01
 Reading After Calibration: 120.1

Dissolved Oxygen (0 mg/L)

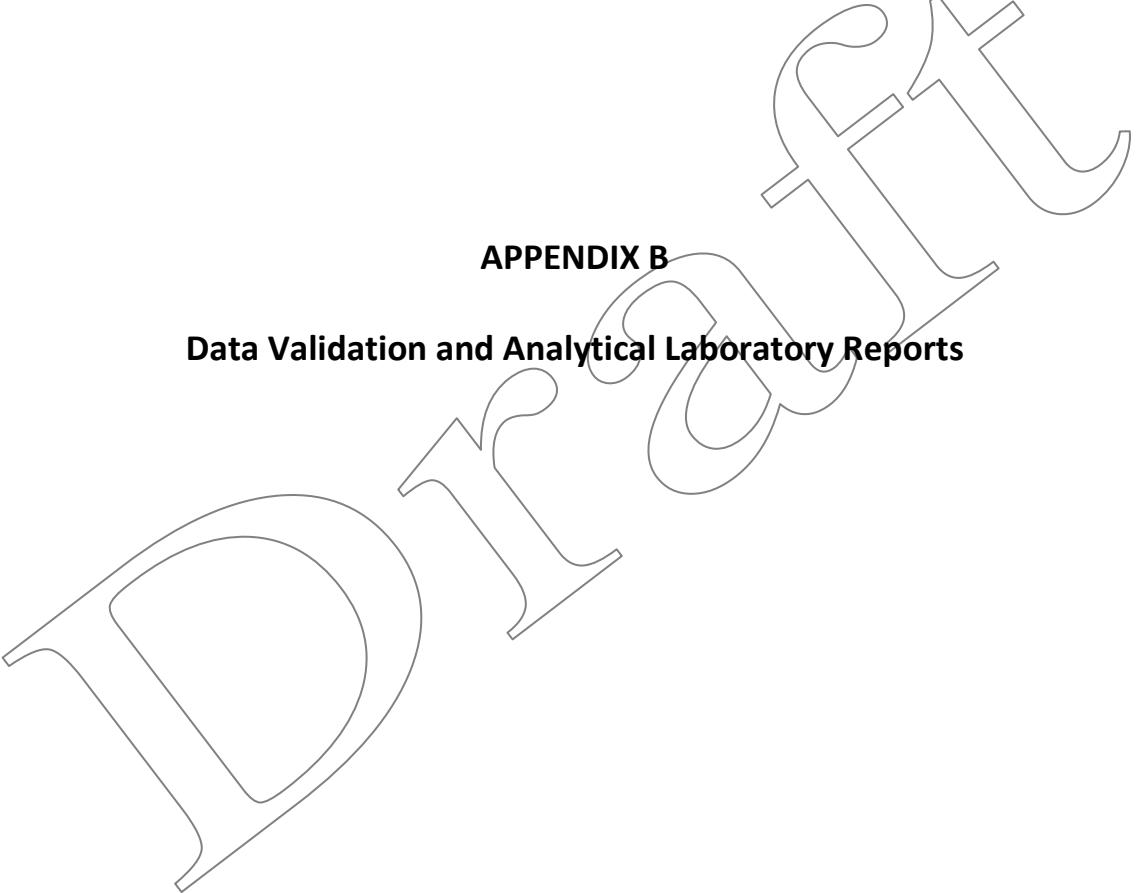
Reading _____
 Temperature (C°) _____
 Lot/Expiration: _____
 Reading less than 0.20 mg/L? _____

PM Calibration Check

Time Start: 1515 Time End: 1535 Temp: 13

DO 100 % 101.3
 pH 7 7.01
 Specific Conductivity 1047
 ORP (mv) 127.3

Notes:



APPENDIX B

Data Validation and Analytical Laboratory Reports

Data Usability Summary Report (DUSR)**Beverly USM****Analytical Laboratory: Alpha Analytical - Mansfield, MA****Sample Delivery Group # L1739241**

Analytical results for the project samples were reviewed to evaluate the data usability. Data was assessed in accordance with guidance from the following Federal and/or State guidance documents:

- USEPA National Functional Guidelines for Superfund Inorganic Data Review (EPA 540-R-013-001)
- USEPA Region 1 "New England Data Validation Functional Guidelines for

Evaluating Environmental Analyses", Revised December 1996

and method protocol criteria where applicable as prescribed by "Test Methods for Evaluating Solid Waste", SW846, 1996 with updates, or "Standard Methods for the Examination of Water and Wastewater", Editions 18-20.

This DUSR pertains to the following samples:

Sample ID	Sample ID
R4A1-102717-0850	BS10-102717-1450
R4B1-102717-0910	
R1A1-102717-1100	
R1B1-102717-1020	
R2A1-102717-1040	
R2B1-102717-1120	
R3A1-102717-0930	
R3B1-102717-0945	
S500-102717-1430	
S400-102717-1420	
S300-102717-1400	
S200-102717-1346	
S100-102717-1335	

Project Samples were analyzed according to the following analytical methods:

Parameter	Analytical Method	Holding Time Criteria
1. MCP Total Metals	EPA 6020A	180 days
2. Mercury	EPA 7474	28 days
3. Acid Volatile Sulfide w/Simultaneous Extracted Metals (AVS-SEM)	EPA 6020A	14 days
4. Total Organic Carbon (TOC)	EPA 9060	28 days
5. Solids, Total Residue as Percent	EPA 160.3	7 days
6. MCP Metals (dissolved)	EPA 6020A	180 days
7. Mercury (dissolved)	EPA 7474	28 days

The following items/criteria applicable to the analysis of project samples and associated QA/QC procedures were reviewed.

- Holding Times
- Blank Sample Analysis
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Duplicate Sample Analysis
- Sample Data Reporting Format
- Data Qualifiers
- Summary

Preservation and Holding Times

Maximum allowable holding times, measured from the time of sample collection to the time of sample preparation or analysis, were met for each project sample analyzed as part of this sample delivery group. No qualification of the data is recommended.

Blank Sample Analysis

Project sample results were reported without qualification unless the concentration of the target analyte or compound in the project sample is less than or equal to 10 times (10X) the concentration detected in the preparation blank sample for metal analytes or are common laboratory contaminants for organic compound analyses such as methylene chloride, acetone, 2-butanone, cyclohexane, and phthalate esters, or less than or equal to 5 times (5X) the concentration for any other target analyte or compound, with the following exception(s):

Blank	Target Analyte(s)	Concn.	Affected Sample(s)	Flag sample results with a "U" if < to this value
MB (WG1058418-1)	Mercury	0.00001 mg/L	S500-102717-1430 S400-102717-1420 S300-102717-1400 S200-102717-1346 S100-102717-1335 BS10-102717-1450	0.0001 mg/L

Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries

Analytical precision and accuracy were evaluated based on the laboratory control and matrix spike sample analyses performed concurrently with the project samples. For matrix spike samples, after the addition of a known amount of each target parameter to the sample matrix, the sample was analyzed to confirm the ability to identify these parameters within the sample matrix. For LCS analyses, after the addition of a known amount of each target parameter into laboratory reagent water, the sample was analyzed to confirm the ability of the analytical system to accurately quantify the parameters. The reported MS/MSD recoveries were outside acceptable limits for several metals associated with project samples RA4A1-102717-0850 and R3B1-102717-0945 however; LCS analyses fell within the laboratory QA acceptance criteria. Additionally, the MS recovery was above acceptable limits for AVS-SEM analyses associated with R3B1-102717-0945 however; the sample concentration is greater than 4x the spike concentration added. No qualification of the data is recommended.

Duplicate Sample Analysis

The replicate percent difference (RPD) was evaluated for each duplicate sample pair to monitor the reproducibility of the data. The RPD for each sample pair was within the QA/QC limit of 30% for aqueous samples and 50% for solid matrices, for those target analytes with sample concentrations greater than 5X the laboratory reporting limit for that parameter. No qualification of the data is recommended.

Sample Data Reporting Format

The sample data package has been reviewed for completeness to confirm that the report contains each required sample analyses and associated QA/QC report forms and was found to be compliant with the project specific data quality objectives (DQO). No additional data report forms are recommended.

Data Qualifiers

Samples that contain results below the laboratory reporting limit (RL) but above the current laboratory MDL were qualified as estimated, "J". The data user should be aware that there is a possibility of false positive or mis-identification of the target compounds at these concentrations. The laboratory also qualified results when target analytes were detected in the associated method/preparation blank sample. Based on a spot check of the reported results, the laboratory data qualifiers were applied to the reported results in accordance with the laboratory standard operating procedures.

Summary

The results presented in each report were found to be compliant with the data quality objectives for the project and usable. Based on our review, the usability of the data is 100%, with the few exceptions noted above.

Data Usability Summary Report (DUSR)
Beverly USM
Analytical Laboratory: Alpha Analytical - Mansfield, MA
Sample Delivery Group # L1739004

Analytical results for the project samples were reviewed to evaluate the data usability. Data was assessed in accordance with guidance from the following Federal and/or State guidance documents:

- USEPA National Functional Guidelines for Superfund Inorganic Data Review (EPA 540-R-013-001)
- USEPA Region 1 "New England Data Validation Functional Guidelines for Evaluating Environmental Analyses", Revised December 1996

and method protocol criteria where applicable as prescribed by "Test Methods for Evaluating Solid Waste", SW846, 1996 with updates, or "Standard Methods for the Examination of Water and Wastewater", Editions 18-20.

This DUSR pertains to the following samples:

Sample ID	Sample ID
BS1A-102617-1335	S2A1-102617-0915
BS1B-102617-1215	BS1A-102617-0002
S5A1-102617-1205	S4A1-102617-0001
S5B1-102617-1125	
S4A1-102617-1310	
S4B1-102617-1135	
S4C1-102617-1025	
S3A1-102617-1150	
S3B1-102617-1105	
S3C1-102617-1010	
S2B1-102617-1050	
S1A1-102617-0930	
S1B1-102617-0945	

Project Samples were analyzed according to the following analytical methods:

Parameter	Analytical Method	Holding Time Criteria
1. MCP Total Metals	EPA 6020A	180 days
2. Mercury	EPA 7474	28 days
3. Acid Volatile Sulfide w/Simultaneous Extracted Metals (AVS-SEM)	EPA 6020A	14 days
4. Total Organic Carbon (TOC)	EPA 9060	28 days
5. Solids, Total Residue as Percent	EPA 160.3	7 days

The following items/criteria applicable to the analysis of project samples and associated QA/QC procedures were reviewed.

- Holding Times
- Blank Sample Analysis
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Duplicate Sample Analysis
- Field Duplicate Sample Analysis
- Sample Data Reporting Format
- Data Qualifiers
- Summary

Preservation and Holding Times

Maximum allowable holding times, measured from the time of sample collection to the time of sample preparation or analysis, were met for each project sample analyzed as part of this sample delivery group. No qualification of the data is recommended.

Blank Sample Analysis

Project sample results were reported without qualification unless the concentration of the target analyte or compound in the project sample is less than or equal to 10 times (10X) the concentration detected in the preparation blank sample for metal analytes or are common laboratory contaminants for organic compound analyses such as methylene chloride, acetone, 2-butanone, cyclohexane, and phthalate esters, or less than or equal to 5 times (5X) the concentration for any other target analyte or compound, with the following exception(s):

Blank	Target Analyte(s)	Concn.	Affected Sample(s)	Flag sample results with a "U" if < to this value
MB (WG1058535-1)	Mercury	0.003 mg/kg	All Project Samples	0.03 mg/kg

Blank	Target Analyte(s)	Concn.	Affected Sample(s)	Flag sample results with a "U" if < to this value
MB (WG1063324-1)	Total Organic Carbon (TOC)	0.015 %	All Project Samples	0.075 %

Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries

Analytical precision and accuracy were evaluated based on the laboratory control and matrix spike sample analyses performed concurrently with the project samples. For matrix spike samples, after the addition of a known amount of each target parameter to the sample matrix, the sample was analyzed to confirm the ability to identify these parameters within the sample matrix. For LCS analyses, after the addition of a known amount of each target parameter into laboratory reagent water, the sample was analyzed to confirm the ability of the analytical system to accurately quantify the parameters. The reported MS/MSD recoveries were outside acceptable limits for several metals associated with project samples BS1A-102617-1335 and S5A1-102617-1205 however; LCS analyses fell within the laboratory QA acceptance criteria. No qualification of the data is recommended.

Duplicate Sample Analysis

The replicate percent difference (RPD) was evaluated for each duplicate sample pair to monitor the reproducibility of the data. The RPD for each sample pair was within the QA/QC limit of 30% for aqueous samples and 50% for solid matrices, for those target analytes with sample concentrations greater than 5X the current laboratory method detection limit (MDL), with the following

Sample ID	Matrix	Target Analyte(s)	RPD	Affected Sample(s)
S5A1-102617-1205	Sediment	Total Organic Carbon (TOC)	51	S5A1-102617-1205

Action:

Analytes with RPDs greater than 20% should be qualified "J" and non-detects qualified "UJ".

Field Duplicate Sample Analysis

The overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures, was evaluated by assessing the relative percent difference (RPD) data from field duplicate samples. All calculated RPD values were within matrix specific data quality objectives, with the exception of results qualified "J" as shown in the table(s) below:

Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	BS1A-102617-1335	BS1A-102617-0002		
Arsenic, Total	35.6	34	5%	
Barium, Total	69.1	72.8	5%	
Cadmium, Total	0.3781	0.4086	8%	
Chromium, Total	366	320	13%	
Copper, Total	419	516	21%	
Lead, Total	819	777	5%	
Nickel, Total	297	288	3%	
Zinc, Total	463	498	7%	

Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	S4A1-102617-1310	S4A1-102617-0001		
Arsenic, Total	16.8	19.1	13%	
Barium, Total	44.8	48	7%	
Cadmium, Total	0.6652	0.5879	12%	
Chromium, Total	249	165	41%	
Copper, Total	364	1360	116%	J
Lead, Total	389	385	1%	
Nickel, Total	34.1	44.3	26%	
Silver, Total	0.779	0.863	10%	
Zinc, Total	291	286	2%	

Action:

If the sample matrix is solid and the %RPD is greater than 50%, the original sample results are qualified "J". If the sample matrix is water or air and the %RPD is greater than 35%, the original sample results are qualified "J".

Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	BS1A-102617-1335	BS1A-102617-0002		
Mercury	2.08	1.29	47%	
Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	S4A1-102617-1310	S4A1-102617-0001		
Mercury	0.514	0.286	57%	J

Action:

If the sample matrix is solid and the %RPD is greater than 50%, the original sample results are qualified "J". If the sample matrix is water or air and the %RPD is greater than 35%, the original sample results are qualified "J".

Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	BS1A-102617-1335	BS1A-102617-0002		
Solids, Total Residue as Percent	62.6	68.9	10%	
Target Analyte(s)	Original Sample ID.	FD Sample ID.	%RPD	Flag Original and FD sample results with:
	S4A1-102617-1310	S4A1-102617-0001		
Solids, Total Residue as Percent	64.4	61.3	5%	

Sample Data Reporting Format

The sample data package has been reviewed for completeness to confirm that the report contains each required sample analyses and associated QA/QC report forms and was found to be compliant with the project specific data quality objectives (DQO). No additional data report forms are recommended.

Data Qualifiers

Samples that contain results below the laboratory reporting limit (RL) but above the current laboratory MDL were qualified as estimated, "J". The data user should be aware that there is a possibility of false positive or mis-identification of the target compounds at these concentrations. The laboratory also qualified results when target analytes were detected in the associated method/preparation blank sample. Based on a spot check of the reported results, the laboratory data qualifiers were applied to the reported results in accordance with the laboratory standard operating procedures.

Summary

The results presented in each report were found to be compliant with the data quality objectives for the project and usable. Based on our review, the usability of the data is 100%, with the few exceptions noted above.



ANALYTICAL REPORT

Lab Number:	L1739241
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Jennifer Sweet
Phone:	(617) 886-7411
Project Name:	BEVERLY USM
Project Number:	37713-002
Report Date:	12/01/17

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1739241-01	R4A1-102717-0850	SOIL	BEVERLY MA	10/27/17 08:50	10/27/17
L1739241-02	R4B1-102717-0910	SOIL	BEVERLY MA	10/27/17 09:10	10/27/17
L1739241-03	R1A1-102717-1100	SOIL	BEVERLY MA	10/27/17 11:00	10/27/17
L1739241-04	R1B1-102717-1020	SOIL	BEVERLY MA	10/27/17 10:20	10/27/17
L1739241-05	R2A1-102717-1040	SOIL	BEVERLY MA	10/27/17 10:40	10/27/17
L1739241-06	R2B1-102717-1120	SOIL	BEVERLY MA	10/27/17 11:20	10/27/17
L1739241-07	R3A1-102717-0930	SOIL	BEVERLY MA	10/27/17 09:30	10/27/17
L1739241-08	R3B1-102717-0945	SOIL	BEVERLY MA	10/27/17 09:45	10/27/17
L1739241-09	S500-102717-1430	WATER	BEVERLY MA	10/27/17 14:30	10/27/17
L1739241-10	S400-102717-1420	WATER	BEVERLY MA	10/27/17 14:20	10/27/17
L1739241-11	S300-102717-1400	WATER	BEVERLY MA	10/27/17 14:00	10/27/17
L1739241-12	S200-102717-1346	WATER	BEVERLY MA	10/27/17 13:46	10/27/17
L1739241-13	S100-102717-1335	WATER	BEVERLY MA	10/27/17 13:35	10/27/17
L1739241-14	BS10-102717-1450	WATER	BEVERLY MA	10/27/17 14:50	10/27/17

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Case Narrative (continued)

Report Revision

December 1, 2017: Results for Pb-SEM have been reported for samples L1739241-01 through -08.

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Total Metals

In reference to question H:

The WG1058537-4/-5 MS/MSD recoveries, performed on L1739241-01, are outside the acceptance criteria for Chromium (0%/0%). Re-analysis of the MS and MSD yielded unacceptable recoveries of <30%. The MS/MSD % recoveries are <30%, but the sample detection is above the RL. The LCS recovery is acceptable; therefore, no further action was taken.

The WG1058537-4 MS recovery, performed on L1739241-01, is outside the acceptance criteria for Lead (67%). Re-analysis of the MS yielded an unacceptable recovery for Lead in the range of 30-74%. The LCS recoveries were within acceptance criteria for these analytes; therefore, no further action was taken.

The WG1058537-5 MSD recovery, performed on L1739241-01, is outside the acceptance criteria for Copper (131%). Re-analysis of the MSD yielded an unacceptable recovery for copper in the range of >125%. The LCS recoveries were within acceptance criteria for these analytes; therefore, no further action was taken.

The WG1058539-5 MSD recovery, performed on L1739241-01, is outside the acceptance criteria for Mercury (55%); however, the associated LCS/LCSD recoveries are within overall method allowances. No further action was required.

The WG1062398-5 MS recoveries, performed on L1739241-08, are outside the acceptance criteria for Copper (339%), Lead (266%) and Zinc (213%); however, the associated LCS recoveries are within overall method allowances. No further action was required.

Dissolved Metals

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Case Narrative (continued)

L1739241-09 and -10: The sample has elevated detection limits for all elements, with the exception of Mercury, due to the dilution required by the high concentrations of target and non-target elements.

L1739241-11 and -14: The sample has elevated detection limits for all elements, with the exception of Mercury, due to the dilution required by the high concentrations of target and non-target elements.

Acid Volatile Sulfide w/Simultaneously Extracted Metals

In reference to question H:

The WG1062896-5 MS recovery (2460%), performed on L1739241-08, does not apply because the sample concentration is greater than four times the spike amount added.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative

Date: 12/01/17

METALS



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-01 Date Collected: 10/27/17 08:50
Client ID: R4A1-102717-0850 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 43%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.72	mg/kg	0.066	0.009	10	11/01/17 16:15	11/04/17 12:07	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	24.0	mg/kg	1.07	1.07	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Barium, Total	102	mg/kg	6.41	6.41	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Cadmium, Total	2.167	mg/kg	0.4272	0.4272	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Chromium, Total	976	mg/kg	4.27	4.27	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Copper, Total	120	mg/kg	4.27	4.27	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Lead, Total	252	mg/kg	1.28	1.28	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Nickel, Total	30.8	mg/kg	2.14	2.14	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Selenium, Total	7.45	mg/kg	4.27	4.27	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Silver, Total	2.29	mg/kg	1.07	1.07	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM
Zinc, Total	287	mg/kg	21.4	21.4	10	11/01/17 16:00	11/02/17 10:18	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	36.4	umoles/gm	0.477	0.312	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.010640	umoles/g	0.006797	0.006797	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM
Copper, Total	0.825461	umoles/g	0.060115	0.060115	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM
Lead, Total	0.652814	umoles/g	0.036870	0.036870	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM
Nickel, Total	0.133393	umoles/g	0.130143	0.130143	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM
Zinc, Total	2.89715	umoles/g	0.116864	0.116864	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM
SEM/AVS Ratio	0.124161	-	-	NA	5	11/10/17 09:15	11/14/17 10:54	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-02 Date Collected: 10/27/17 09:10
Client ID: R4B1-102717-0910 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 40%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.89	mg/kg	0.031	0.004	5	11/01/17 16:15	11/04/17 11:52	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	26.7	mg/kg	1.17	1.17	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Barium, Total	105	mg/kg	7.04	7.04	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Cadmium, Total	2.578	mg/kg	0.4694	0.4694	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Chromium, Total	1280	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Copper, Total	150	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Lead, Total	332	mg/kg	1.41	1.41	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Nickel, Total	36.3	mg/kg	2.35	2.35	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Selenium, Total	6.26	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Silver, Total	3.00	mg/kg	1.17	1.17	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM
Zinc, Total	349	mg/kg	23.5	23.5	10	11/01/17 16:00	11/02/17 10:30	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	39.1	umoles/gm	0.504	0.312	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.015179	umoles/g	0.007186	0.007186	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM
Copper, Total	1.18766	umoles/g	0.063554	0.063554	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM
Lead, Total	1.15876	umoles/g	0.038979	0.038979	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM
Nickel, Total	0.193721	umoles/g	0.137589	0.137589	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM
Zinc, Total	3.66067	umoles/g	0.123550	0.123550	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM
SEM/AVS Ratio	0.158977	-	-	NA	5	11/10/17 09:15	11/14/17 10:57	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-03 Date Collected: 10/27/17 11:00
Client ID: R1A1-102717-1100 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 46%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.973	mg/kg	0.028	0.004	5	11/01/17 16:15	11/04/17 11:55	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	18.9	mg/kg	1.01	1.01	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Barium, Total	66.4	mg/kg	6.08	6.08	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Cadmium, Total	1.400	mg/kg	0.4051	0.4051	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Chromium, Total	685	mg/kg	4.05	4.05	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Copper, Total	101	mg/kg	4.05	4.05	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Lead, Total	168	mg/kg	1.22	1.22	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Nickel, Total	23.7	mg/kg	2.02	2.02	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Selenium, Total	5.20	mg/kg	4.05	4.05	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Silver, Total	1.45	mg/kg	1.01	1.01	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM
Zinc, Total	236	mg/kg	20.2	20.2	10	11/01/17 16:00	11/02/17 10:34	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	2.16	umoles/gm	0.247	0.247	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.009098	umoles/g	0.003525	0.003525	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM
Copper, Total	0.839635	umoles/g	0.031175	0.031175	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM
Lead, Total	0.682196	umoles/g	0.019120	0.019120	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM
Nickel, Total	0.116969	umoles/g	0.067491	0.067491	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM
Zinc, Total	2.43785	umoles/g	0.060604	0.060604	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM
SEM/AVS Ratio	1.89155	-	-	NA	5	11/10/17 09:15	11/14/17 11:01	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-04 Date Collected: 10/27/17 10:20
Client ID: R1B1-102717-1020 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 45%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.04	mg/kg	0.033	0.004	5	11/01/17 16:15	11/04/17 11:57	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	22.5	mg/kg	1.11	1.11	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Barium, Total	74.2	mg/kg	6.68	6.68	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Cadmium, Total	1.705	mg/kg	0.4454	0.4454	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Chromium, Total	836	mg/kg	4.45	4.45	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Copper, Total	133	mg/kg	4.45	4.45	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Lead, Total	230	mg/kg	1.34	1.34	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Nickel, Total	30.7	mg/kg	2.23	2.23	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Selenium, Total	6.20	mg/kg	4.45	4.45	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Silver, Total	2.12	mg/kg	1.11	1.11	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM
Zinc, Total	295	mg/kg	22.3	22.3	10	11/01/17 16:00	11/02/17 11:25	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	24.3	umoles/gm	0.233	0.233	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.014366	umoles/g	0.003325	0.003325	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM
Copper, Total	0.759197	umoles/g	0.029406	0.029406	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM
Lead, Total	0.929513	umoles/g	0.018035	0.018035	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM
Nickel, Total	0.118223	umoles/g	0.063660	0.063660	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM
Zinc, Total	2.97482	umoles/g	0.057165	0.057165	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM
SEM/AVS Ratio	0.197371	-	-	NA	5	11/10/17 09:15	11/14/17 11:05	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-05 Date Collected: 10/27/17 10:40
Client ID: R2A1-102717-1040 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 61%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.59	mg/kg	0.023	0.003	5	11/01/17 16:15	11/04/17 12:00	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	23.1	mg/kg	0.799	0.799	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Barium, Total	47.2	mg/kg	4.80	4.80	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Cadmium, Total	0.8210	mg/kg	0.3198	0.3198	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Chromium, Total	362	mg/kg	3.20	3.20	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Copper, Total	70.2	mg/kg	3.20	3.20	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Lead, Total	132	mg/kg	0.959	0.959	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Nickel, Total	20.9	mg/kg	1.60	1.60	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Selenium, Total	4.51	mg/kg	3.20	3.20	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Silver, Total	0.837	mg/kg	0.799	0.799	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM
Zinc, Total	189	mg/kg	16.0	16.0	10	11/01/17 16:00	11/02/17 11:29	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	9.83	umoles/gm	0.190	0.190	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	ND	umoles/g	0.002714	0.002714	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM
Copper, Total	0.272995	umoles/g	0.024002	0.024002	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM
Lead, Total	0.264854	umoles/g	0.014721	0.014721	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM
Nickel, Total	0.061163	umoles/g	0.051963	0.051963	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM
Zinc, Total	0.913027	umoles/g	0.046661	0.046661	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM
SEM/AVS Ratio	0.153819	-	-	NA	5	11/10/17 11:15	11/14/17 11:09	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-06 Date Collected: 10/27/17 11:20
Client ID: R2B1-102717-1120 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 48%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.74	mg/kg	0.028	0.004	5	11/01/17 16:15	11/04/17 12:15	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	32.0	mg/kg	1.04	1.04	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Barium, Total	78.9	mg/kg	6.23	6.23	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Cadmium, Total	1.744	mg/kg	0.4152	0.4152	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Chromium, Total	700	mg/kg	4.15	4.15	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Copper, Total	93.6	mg/kg	4.15	4.15	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Lead, Total	218	mg/kg	1.24	1.24	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Nickel, Total	28.9	mg/kg	2.08	2.08	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Selenium, Total	5.77	mg/kg	4.15	4.15	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Silver, Total	1.73	mg/kg	1.04	1.04	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM
Zinc, Total	249	mg/kg	20.8	20.8	10	11/01/17 16:00	11/02/17 11:33	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	18.8	umoles/gm	0.250	0.250	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.010370	umoles/g	0.003567	0.003567	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM
Copper, Total	0.710288	umoles/g	0.031549	0.031549	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM
Lead, Total	0.956207	umoles/g	0.019350	0.019350	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM
Nickel, Total	0.140162	umoles/g	0.068301	0.068301	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM
Zinc, Total	2.52691	umoles/g	0.061332	0.061332	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM
SEM/AVS Ratio	0.231060	-	-	NA	5	11/10/17 11:15	11/14/17 11:13	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-07 Date Collected: 10/27/17 09:30
Client ID: R3A1-102717-0930 Date Received: 10/27/17
Sample Location: BEVERLY MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 44%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.35	mg/kg	0.027	0.004	5	11/01/17 16:15	11/04/17 12:17	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	24.2	mg/kg	1.12	1.12	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Barium, Total	87.3	mg/kg	6.72	6.72	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Cadmium, Total	2.203	mg/kg	0.4482	0.4482	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Chromium, Total	1010	mg/kg	4.48	4.48	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Copper, Total	119	mg/kg	4.48	4.48	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Lead, Total	253	mg/kg	1.34	1.34	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Nickel, Total	29.3	mg/kg	2.24	2.24	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Selenium, Total	6.14	mg/kg	4.48	4.48	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Silver, Total	2.24	mg/kg	1.12	1.12	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM
Zinc, Total	356	mg/kg	22.4	22.4	10	11/01/17 16:00	11/02/17 12:41	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	49.8	umoles/gm	0.245	0.245	1	11/10/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.018385	umoles/g	0.003495	0.003495	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM
Copper, Total	1.39721	umoles/g	0.030909	0.030909	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM
Lead, Total	1.64147	umoles/g	0.018957	0.018957	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM
Nickel, Total	0.187284	umoles/g	0.066914	0.066914	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM
Zinc, Total	16.6942	umoles/g	0.060086	0.060086	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM
SEM/AVS Ratio	0.400372	-	-	NA	5	11/10/17 11:15	11/14/17 11:16	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-08
Client ID: R3B1-102717-0945
Sample Location: BEVERLY MA
Matrix: Soil
Percent Solids: 43%

Date Collected: 10/27/17 09:45
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.20	mg/kg	0.029	0.004	5	11/01/17 16:15	11/04/17 12:20	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	19.0	mg/kg	1.17	1.17	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Barium, Total	69.7	mg/kg	7.03	7.03	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Cadmium, Total	2.024	mg/kg	0.4687	0.4687	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Chromium, Total	821	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Copper, Total	120	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Lead, Total	199	mg/kg	1.41	1.41	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Nickel, Total	24.7	mg/kg	2.34	2.34	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Selenium, Total	5.30	mg/kg	4.69	4.69	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Silver, Total	1.99	mg/kg	1.17	1.17	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM
Zinc, Total	251	mg/kg	23.4	23.4	10	11/01/17 16:00	11/02/17 12:46	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	15.9	umoles/gm	0.180	0.180	1		11/09/17 10:00	36,-	36,-	CA
Cadmium, Total	0.011727	umoles/g	0.002569	0.002569	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM
Copper, Total	0.848042	umoles/g	0.022718	0.022718	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM
Lead, Total	0.910681	umoles/g	0.013934	0.013934	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM
Nickel, Total	0.117452	umoles/g	0.049183	0.049183	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM
Zinc, Total	2.50520	umoles/g	0.044165	0.044165	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM
SEM/AVS Ratio	0.276296	-	-	NA	5	11/10/17 11:15	11/14/17 11:52	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-09
Client ID: S500-102717-1430
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 14:30
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0175		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	11/01/17 10:32	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:00	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-10
Client ID: S400-102717-1420
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 14:20
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0133		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	11/01/17 10:36	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:08	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-11
Client ID: S300-102717-1400
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 14:00
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0066		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	10/31/17 17:41	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:10	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-12
Client ID: S200-102717-1346
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 13:46
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0064		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	10/31/17 17:45	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:12	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-13
Client ID: S100-102717-1335
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 13:35
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0066		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	10/31/17 17:50	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:15	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-14
Client ID: BS10-102717-1450
Sample Location: BEVERLY MA
Matrix: Water

Date Collected: 10/27/17 14:50
Date Received: 10/27/17
Field Prep: Field Filtered
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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MCP Dissolved Metals - Mansfield Lab

Arsenic, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Barium, Dissolved	0.0111		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Cadmium, Dissolved	ND		mg/l	0.0020	0.0020	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Chromium, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Copper, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Lead, Dissolved	ND		mg/l	0.010	0.010	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Nickel, Dissolved	ND		mg/l	0.0200	0.0200	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Selenium, Dissolved	ND		mg/l	0.050	0.050	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Silver, Dissolved	ND		mg/l	0.0050	0.0050	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM
Zinc, Dissolved	ND		mg/l	0.100	0.100	10	10/31/17 10:35	10/31/17 17:54	EPA 3005A	97,6020A	AM

Dissolved Metals - Mansfield Lab

Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 16:17	EPA 7474	1,7474	BV
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Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 09-14 Batch: WG1058003-1									
Arsenic, Dissolved	ND	mg/l	0.0005	0.0005	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Barium, Dissolved	ND	mg/l	0.0005	0.0005	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Cadmium, Dissolved	ND	mg/l	0.0002	0.0002	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Chromium, Dissolved	ND	mg/l	0.001	0.001	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Copper, Dissolved	ND	mg/l	0.001	0.001	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Lead, Dissolved	ND	mg/l	0.001	0.001	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Nickel, Dissolved	ND	mg/l	0.0020	0.0020	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Selenium, Dissolved	ND	mg/l	0.005	0.005	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Silver, Dissolved	ND	mg/l	0.0005	0.0005	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM
Zinc, Dissolved	ND	mg/l	0.010	0.010	1	10/31/17 10:35	10/31/17 15:03	97,6020A	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst	
Dissolved Metals - Mansfield Lab for sample(s): 09-14 Batch: WG1058418-1										
Mercury, Dissolved	0.00001	J	mg/l	0.00005	0.00001	1	11/01/17 19:44	11/03/17 15:55	1,7474	BV

Prep Information

Digestion Method: EPA 7474

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1058537-1									
Arsenic, Total	ND	mg/kg	0.500	0.500	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Barium, Total	ND	mg/kg	3.00	3.00	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Cadmium, Total	ND	mg/kg	0.2000	0.2000	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Chromium, Total	ND	mg/kg	2.00	2.00	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Copper, Total	ND	mg/kg	2.00	2.00	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Lead, Total	ND	mg/kg	0.600	0.600	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Nickel, Total	ND	mg/kg	1.00	1.00	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Method Blank Analysis Batch Quality Control

Selenium, Total	ND	mg/kg	2.00	2.00	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Silver, Total	ND	mg/kg	0.500	0.500	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM
Zinc, Total	ND	mg/kg	10.0	10.0	10	11/01/17 16:00	11/02/17 10:06	97,6020A	AM

Prep Information

Digestion Method: EPA 3050B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-08 Batch: WG1058539-1									
Mercury, Total	ND	mg/kg	0.013	0.002	5	11/01/17 16:15	11/04/17 11:37	1,7474	BV

Prep Information

Digestion Method: EPA 7474

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 01-07 Batch: WG1062396-1									
Cadmium, Total	ND	umoles/g	0.008897	0.008897	5	11/10/17 09:15	11/14/17 09:57	1,6020A	AM
Copper, Total	ND	umoles/g	0.078691	0.078691	5	11/10/17 09:15	11/14/17 09:57	1,6020A	AM
Lead, Total	ND	umoles/g	0.048263	0.048263	5	11/10/17 09:15	11/14/17 09:57	1,6020A	AM
Nickel, Total	ND	umoles/g	0.170358	0.170358	5	11/10/17 09:15	11/14/17 09:57	1,6020A	AM
Zinc, Total	ND	umoles/g	0.152975	0.152975	5	11/10/17 09:15	11/14/17 09:57	1,6020A	AM

Prep Information

Digestion Method: 36,-

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 08 Batch: WG1062398-1									
Cadmium, Total	ND	umoles/g	0.008897	0.008897	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Copper, Total	ND	umoles/g	0.078691	0.078691	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Lead, Total	ND	umoles/g	0.048263	0.048263	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Nickel, Total	ND	umoles/g	0.170358	0.170358	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Method Blank Analysis Batch Quality Control

Zinc, Total	ND	umoles/g	0.152975	0.152975	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
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Prep Information

Digestion Method: 36,-

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 08 Batch: WG1062896-1									
Sulfide, Acid Volatile	ND	umoles/gm	0.624	0.312	1		11/09/17 10:00	36,-	CA

Prep Information

Digestion Method: 36,-

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 01-07 Batch: WG1062898-1									
Sulfide, Acid Volatile	ND	umoles/gm	0.624	0.312	1		11/10/17 10:00	36,-	CA

Prep Information

Digestion Method: 36,-



Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 09-14 Batch: WG1058003-2 WG1058003-3								
Arsenic, Dissolved	102		102		80-120	0		20
Barium, Dissolved	106		107		80-120	1		20
Cadmium, Dissolved	110		116		80-120	5		20
Chromium, Dissolved	103		106		80-120	3		20
Copper, Dissolved	101		100		80-120	1		20
Lead, Dissolved	107		109		80-120	2		20
Nickel, Dissolved	100		101		80-120	1		20
Selenium, Dissolved	110		112		80-120	2		20
Silver, Dissolved	101		103		80-120	2		20
Zinc, Dissolved	101		102		80-120	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 09-14 Batch: WG1058418-2 SRM Lot Number: HPHGAF								
Mercury, Dissolved	100		-		80-120	-		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1058537-2 WG1058537-3 SRM Lot Number: D098-540					
Arsenic, Total	104	99	83-117	5	30
Barium, Total	98	95	82-118	3	30
Cadmium, Total	111	115	82-117	4	30
Chromium, Total	104	99	83-119	5	30
Copper, Total	111	102	84-116	8	30
Lead, Total	102	95	82-117	7	30
Nickel, Total	108	112	82-117	4	30
Selenium, Total	112	105	78-121	6	30
Silver, Total	104	100	80-120	4	30
Zinc, Total	103	102	81-119	1	30
Total Metals - Mansfield Lab Associated sample(s): 01-08 Batch: WG1058539-2 WG1058539-3 SRM Lot Number: D098-540					
Mercury, Total	80	84	50-149	5	20

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG1062396-2 SRM Lot Number: A2METSPIKE					
Cadmium, Total	107	-	80-120	-	20
Copper, Total	112	-	80-120	-	20
Lead, Total	96	-	80-120	-	20
Nickel, Total	100	-	80-120	-	20
Zinc, Total	114	-	80-120	-	20

Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 08 Batch: WG1062398-2 SRM Lot Number: A2METSPIKE					
Cadmium, Total	102	-	80-120	-	20
Copper, Total	111	-	80-120	-	20
Lead, Total	96	-	80-120	-	20
Nickel, Total	99	-	80-120	-	20
Zinc, Total	111	-	80-120	-	20
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 08 Batch: WG1062896-2					
Sulfide, Acid Volatile	111	-	80-120	-	20
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG1062898-2					
Sulfide, Acid Volatile	97	-	80-120	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD RPD	Qual Qual	RPD Limits
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Dissolved Metals - Mansfield Lab Associated sample(s): 09-14 QC Batch ID: WG1058418-3 QC Sample: L1739241-09 Client ID: S500-102717-1430

Mercury, Dissolved	0.00001J	0.0025	0.00245	98	-	-	-	-	80-120	-	-	20
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MCP Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1058537-4 WG1058537-5 QC Sample: L1739241-01 Client ID: R4A1-102717-0850

Arsenic, Total	24.0	22.1	44.4	92	45.6	98	75-125	3	35		
Barium, Total	102.	369	456	96	477	103	75-125	5	35		
Cadmium, Total	2.167	9.4	12.20	107	12.82	114	75-125	5	35		
Chromium, Total	976.	36.9	914	0	Q	916	0	Q	75-125	0	35
Copper, Total	120.	46.1	163	93	180	131	Q	75-125	10	35	
Lead, Total	252.	94	315	67	Q	340	94	75-125	8	35	
Nickel, Total	30.8	92.2	116	92	118	95	75-125	2	35		
Selenium, Total	7.45	22.1	28.1	93	28.8	97	75-125	2	35		
Silver, Total	2.29	55.3	55.4	96	57.8	101	75-125	4	35		
Zinc, Total	287.	92.2	369	89	368	89	75-125	0	35		

Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1058539-4 WG1058539-5 QC Sample: L1739241-01 Client ID: R4A1-102717-0850

Mercury, Total	1.72	1.32	2.88	88	2.46	55	Q	80-120	16	20
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Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits	
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 08 QC Batch ID: WG1062398-5 QC Sample: L1739241-08										
Client ID: R3B1-102717-0945										
Cadmium, Total	0.011727	0.063167259 7864769	0.081278	110	-	-	75-125	-	20	
Copper, Total	0.848042	0.223481271 639912	1.60603	339	Q	-	75-125	-	20	
Lead, Total	0.910681	0.342664092 664093	1.82190	266	Q	-	75-125	-	20	
Nickel, Total	0.117452	0.241908006 81431	0.413472	122	-	-	75-125	-	20	
Zinc, Total	2.50520	1.086125133 85345	4.81343	213	Q	-	75-125	-	20	
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 08 QC Batch ID: WG1062896-5 QC Sample: L1739241-08										
Client ID: R3B1-102717-0945										
Sulfide, Acid Volatile	15.9	0.177	60.0	2460	Q	-	-	75-125	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 09-14 QC Batch ID: WG1058418-4 QC Sample: L1739241-09 Client ID: S500-102717-1430						
Mercury, Dissolved	0.00001J	0.00001J	mg/l	NC		20

Project Name: BEVERLY USM
Project Number: 37713-002

**Lab Serial Dilution
Analysis
Batch Quality Control**

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	Serial Dilution	Units	% D	Qual	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1058537-7 QC Sample: L1739241-01 Client ID: R4A1-102717-0850						
Chromium, Total	976.	985	mg/kg	1		10
Lead, Total	252.	240	mg/kg	5		10

INORGANICS & MISCELLANEOUS



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-01
Client ID: R4A1-102717-0850
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 08:50
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	5.04		%	0.010	0.010	1	-	11/15/17 08:05	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	42.5		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-02
Client ID: R4B1-102717-0910
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 09:10
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.77		%	0.010	0.010	1	-	11/15/17 08:20	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	40.2		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-03
Client ID: R1A1-102717-1100
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 11:00
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.39		%	0.010	0.010	1	-	11/15/17 08:25	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	46.4		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-04
Client ID: R1B1-102717-1020
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 10:20
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.22		%	0.010	0.010	1	-	11/15/17 08:30	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	44.9		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-05
Client ID: R2A1-102717-1040
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 10:40
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.50		%	0.010	0.010	1	-	11/15/17 08:35	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	60.6		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-06
Client ID: R2B1-102717-1120
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 11:20
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.16		%	0.010	0.010	1	-	11/15/17 09:15	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	47.6		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-07
Client ID: R3A1-102717-0930
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 09:30
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.17		%	0.010	0.010	1	-	11/15/17 09:20	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	44.2		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

SAMPLE RESULTS

Lab ID: L1739241-08
Client ID: R3B1-102717-0945
Sample Location: BEVERLY MA
Matrix: Soil

Date Collected: 10/27/17 09:45
Date Received: 10/27/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	5.40		%	0.010	0.010	1	-	11/15/17 09:25	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	42.5		%	0.100	0.100	1	-	11/01/17 08:18	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab for sample(s): 01-08 Batch: WG1063326-1									
Total Organic Carbon	ND	%	0.010	0.010	1	-	11/15/17 07:59	1,9060A	LC



Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM

Project Number: 37713-002

Lab Number: L1739241

Report Date: 12/01/17

Parameter	LCS	LCSD	%Recovery		RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual			
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-08 Batch: WG1063326-2							
Total Organic Carbon	111	-	-	-	75-125	-	25

Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	Recovery Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1063326-4 QC Sample: L1739241-01 Client ID: R4A1-102717-0850												
Total Organic Carbon	5.04	1.47	6.20	79	-	-	-	75-125	-	-	-	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1058361-1 QC Sample: L1739241-01 Client ID: R4A1-102717-0850						
Solids, Total	42.5	39.9	%	6		10
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-08 QC Batch ID: WG1063326-3 QC Sample: L1739241-01 Client ID: R4A1-102717-0850						
Total Organic Carbon	5.04	4.19	%	18		25

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:12011716:20
Lab Number: L1739241
Report Date: 12/01/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739241-01A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-01B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-01B1	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-01B2	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-01C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-01D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-01E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-02A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:12011716:20
Lab Number: L1739241
Report Date: 12/01/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739241-02B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-02C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-02D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-02E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-03A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-03B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-03C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-03D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-03E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-04A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-04B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-04C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:12011716:20
Lab Number: L1739241
Report Date: 12/01/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739241-04D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-04E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-05A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-05B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-05C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-05D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-05E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-06A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-06B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-06C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-06D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-06E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-07A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739241-07B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-07C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-07D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-07E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-08A	Plastic 2oz unpreserved for TS	B	NA		3.6	Y	Absent		A2-TS(7)
L1739241-08B	Glass 60mL/2oz unpreserved	B	NA		3.6	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739241-08C	Glass 120ml/4oz unpreserved	B	NA		3.6	Y	Absent		A2-TOC-9060(28)
L1739241-08D	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-08E	Vial Large Septa unpreserved (4oz)	B	NA		3.6	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739241-09A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739241-10A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)
L1739241-11A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)
L1739241-12A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)
L1739241-13A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)
L1739241-14A	Plastic 250ml HNO3 preserved	A	<2	<2	2.4	Y	Absent		A2-PREP-7470A/245.1(28),A2-SE-MCP6020S-10(180),A2-ZN-MCP6020S-10(180),A2-BA-MCP6020S-10(180),A2-NI-MCP6020S-10(180),A2-PB-MCP6020S-10(180),A2-CD-MCP6020S-10(180),A2-AS-MCP6020S-10(180),A2-HG-7474S(28),A2-PREP-3020(180),A2-CR-MCP6020S-10(180),A2-CU-MCP6020S-10(180),A2-AG-MCP6020S-10(180)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739241
Report Date: 12/01/17

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

- Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.
- Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.
- Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.
- Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.
- Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A - Spectra identified as "Aldol Condensation Product".
- B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers



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Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedances are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

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REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 36 Draft Analytical Method for Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment. PB93-155901, 1991.
- 97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at its own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility

EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO₂, NO₃.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility

SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water

EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C**, **SM4500CN-CE**, **EPA 180.1**, **SM2130B**, **SM4500CI-D**, **SM2320B**, **SM2540C**, **SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2**: THMs and VOCs; **EPA 504.1**: EDB, DBCP.
Microbiology: **SM9215B**; **SM9223-P/A**, **SM9223B-Colilert-QT**,**SM9222D**.

Non-Potable Water

SM4500H,B, **EPA 120.1**, **SM2510B**, **SM2540C**, **SM2320B**, **SM4500CL-E**, **SM4500F-BC**, **SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, LACHAT 10-107-06-1-B: Ammonia-N, **SM4500NO3-F**, **EPA 353.2**: Nitrate-N, **EPA 351.1**, **SM4500P-E**, **SM4500P-B**, **E**, **SM4500SO4-E**, **SM5220D**, **EPA 410.4**, **SM5210B**, **SM5310C**, **SM4500CL-D**, **EPA 1664**, **EPA 420.1**, **SM4500-CN-CE**, **SM2540D**.
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT**; **Enterolert-QT**, **SM9221E**.

Mansfield Facility:

Drinking Water

EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8**: Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1 Hg**.

Non-Potable Water

EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

 CHAIN OF CUSTODY		Service Centers Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430 Albany, NY 12205 Tonawanda, NY 14215 Holmes, PA 19043		Page 1 of 2		Date Rec'd in Lab 10/28/17		ALPHA Job # L1739241	
Westborough, MA 01561 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288		Project Information		Deliverables		Billing Information	
				Project Name: Beverly USM Project Location: Beverly MA		<input checked="" type="checkbox"/> Email <input type="checkbox"/> Fax <input type="checkbox"/> EQuIS (1 File) <input checked="" type="checkbox"/> EQuIS (4 File) <input type="checkbox"/> Other:		<input type="checkbox"/> Same as Client Info PO #	
H&A Information		Project # 37713-002 (Use Project name as Project #) <input type="checkbox"/>		Regulatory Requirements (Program/Criteria)		Disposal Site Information			
H&A Client: Stop & Shop H&A Address: 465 Medford Street Boston, MA 02129 H&A Phone: 617-886-7400 H&A Fax: H&A Email: Kaledpis, Esteinberg		Project Manager: J. Sweet ALPHAQuote #: Turn-Around Time Standard <input checked="" type="checkbox"/> Due Date: Rush (only if pre approved) <input type="checkbox"/> # of Days: 5 Day		MA RCS-1 EPA See Project QAPP				Please identify below location of applicable disposal facilities. Disposal Facility: <input type="checkbox"/> NJ <input type="checkbox"/> NY <input type="checkbox"/> Other:	
								Note: Select State from menu & identify criteria.	
These samples have been previously analyzed by Alpha <input type="checkbox"/>				ANALYSIS				Sample Filtration	
Other project specific requirements/comments: See project-specific QAPP								<input type="checkbox"/> Done <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do <i>(Please Specify below)</i>	
Please specify Metals or TAL..								Sample Specific Comments	
34241-01 02 03 04 05 06 07 08	CRS-102417	Collection		Sample Matrix SED	Sampler's Initials SC /CRS	1. RCRA 8 metals 2. Copper, Nickel, Zinc 3. AVS/SEM	70°C Hold 86° Lead	Total Bottom Top	Metals only Metals only Metals only Metals only Metals only Metals only Metals only Metals only Metals only
		Date	Time						
		10/27/17	0850						
			0850						
			0850						
			0910						
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	0930								
	1027/17 0945								
Preservative Code: A = None P = Plastic B = HCl C = HNO3 D = H2SO4 E = NaOH F = MeOH G = NaHSO4 H = Na2S2O3 K/E = Zn Ac/NaOH O = Other		Container Code: A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type A A A A		Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.	
						Preservative A A A A			
Relinquished By: Steve Clough H&A Steve Clough H&A Steve Clough H&A		Date/Time 10/27/17 1455 10-27-17 1720 10/28/17 0805		Received By: Donald AAC Donald Matt Tom Black		Date/Time 10-27-17 17:55 10/27/17 17:20 10/28/17 08:05			
Document ID: 20455 Rev 1 (1/28/2016)									

 CHAIN OF CUSTODY		Service Centers Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430 Albany, NY 12205 Tonawanda, NY 14150 Holmes, PA 19043		Page 2 of 2		Date Rec'd in Lab 10/28/17		ALPHA Job # L1739241	
Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288		Project Information Project Name: Beverly USM Project Location: Beverly MA		Deliverables <input checked="" type="checkbox"/> Email <input type="checkbox"/> Fax <input type="checkbox"/> EQuIS (1 File) <input checked="" type="checkbox"/> EQuIS (4 File) <input type="checkbox"/> Other:		Billing Information <input type="checkbox"/> Same as Client Info PO #	
H&A Information		Project # 37713-002 (Use Project name as Project #) <input type="checkbox"/>		Regulatory Requirements (Program/Criteria) MA RCGW-2 EPA See Project QAPP		Disposal Site Information Please identify below location of applicable disposal facilities.			
H&A Client: Stop & Shop H&A Address: 465 Medford Street Boston, MA 02129 H&A Phone: 617-886-7400 H&A Fax: H&A Email: Kalepidis, Esteinberg		Project Manager: J. Sweet ALPHAQuote #:						Disposal Facility: <input type="checkbox"/> NJ <input type="checkbox"/> NY <input type="checkbox"/> Other:	
		Turn-Around Time Standard <input checked="" type="checkbox"/> Due Date: Rush (only if pre approved) <input type="checkbox"/> # of Days: 5 Day				Note: Select State from menu & identify criteria.			
These samples have been previously analyzed by Alpha <input type="checkbox"/>				ANALYSIS				Sample Filtration <input type="checkbox"/> Done <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do (Please Specify below)	
Other project specific requirements/comments: See project-specific QAPP A Dissoluth (F.F.)								Sample Specific Comments	
Please specify Metals or TAL.									
ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	1. RCRA 8 metals 2. Copper, Nickel, Zinc			Total Bottles
		Date	Time						
29241 .09	S500- 102717-1430	10/27/17	1430	SW	SC	X X			1
.10	S400- 102717-1420		1420	SW	SC	X X			1
.11	S300- 102717-1400		1400	SW	SC	X X			1
.12	S200- 102717-1346		1346	SW	SC	X X			1
.13	S100- 102717-1335		1335	SW	SC	X X			1
.14	BS10- 102717-1450	10/27/17	1450	SW	SC	X X			1
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃ K/E = Zn Ac/NaOH O = Other		Container Code P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type P P		Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.	
						Preservative C C			
Relinquished By: Steve Clough H&A [Signature]		Date/Time 10/27/17 14:55		Received By: Denice APR 10/27/17 14:55		Date/Time 10/27/17 17:20			
O'Leary H&A [Signature]		10/27/17 17:20		Danielle Martt [Signature]		10/27/17 17:20			
[Signature]		10/28/17 08:05		[Signature]		10/28/17 08:05			



ANALYTICAL REPORT

Lab Number:	L1739004
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Jennifer Sweet
Phone:	(617) 886-7411
Project Name:	BEVERLY USM
Project Number:	37713-002
Report Date:	11/29/17

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1739004-01	BS1A-102617-1335	SOIL	BEVERLY, MA	10/26/17 13:35	10/26/17
L1739004-02	BS1B-102617-1215	SOIL	BEVERLY, MA	10/26/17 12:15	10/26/17
L1739004-03	S5A1-102617-1205	SOIL	BEVERLY, MA	10/26/17 12:05	10/26/17
L1739004-04	S5B1-102617-1125	SOIL	BEVERLY, MA	10/26/17 11:25	10/26/17
L1739004-05	S4A1-102617-1310	SOIL	BEVERLY, MA	10/26/17 13:10	10/26/17
L1739004-06	S4B1-102617-1135	SOIL	BEVERLY, MA	10/26/17 11:35	10/26/17
L1739004-07	S4C1-102617-1025	SOIL	BEVERLY, MA	10/26/17 10:25	10/26/17
L1739004-08	S3A1-102617-1150	SOIL	BEVERLY, MA	10/26/17 11:50	10/26/17
L1739004-09	S3B1-102617-1105	SOIL	BEVERLY, MA	10/26/17 11:05	10/26/17
L1739004-10	S3C1-102617-1010	SOIL	BEVERLY, MA	10/26/17 10:10	10/26/17
L1739004-11	S2B1-102617-1050	SOIL	BEVERLY, MA	10/26/17 10:50	10/26/17
L1739004-12	S1A1-102617-0930	SOIL	BEVERLY, MA	10/26/17 09:30	10/26/17
L1739004-13	S1B1-102617-0945	SOIL	BEVERLY, MA	10/26/17 09:45	10/26/17
L1739004-14	S2A1-102617-0915	SOIL	BEVERLY, MA	10/26/17 09:15	10/26/17
L1739004-15	BS1A-102617-0002	SOIL	BEVERLY, MA	10/26/17 00:00	10/26/17
L1739004-16	S4A1-102617-0001	SOIL	BEVERLY, MA	10/26/17 00:00	10/26/17

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Case Narrative (continued)

Report Revision

November 29, 2017: Results for Pb-SEM have been reported for samples L1739004-01 through -14.

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Total Metals

In reference to question H:

The WG1058534-4 MS recoveries, performed on L1739004-03, are outside the acceptance criteria for silver (63%), chromium (289%), lead (509%), nickel (158%) and zinc (254%). Re-analysis of the MS yielded unacceptable recoveries for silver, chromium, lead, nickel, and zinc in the range of 30-74% or >125%. The LCS recoveries were within acceptance criteria for these analytes; therefore, no further action was taken.

The WG1058534-5 MSD recoveries, performed on L1739004-03, are outside the acceptance criteria for copper (36%), silver (61%), lead (322%) and zinc (355%). Re-analysis of the MSD yielded unacceptable recoveries for copper, silver, lead, and zinc in the range of 30-74% or >125%. The LCS recoveries were within acceptance criteria for these analytes; therefore, no further action was taken.

The WG1058534-7 serial dilution analysis, associated with L1739004-03, had a %D above the acceptance criteria for lead (13%).

The WG1062398-3 MS recoveries, performed on L1739004-01, are outside the acceptance criteria for copper (197%), lead (439%), nickel (239%) and zinc (145%); however, the associated LCS recoveries are within overall method allowances. No further action was required.

The WG1062398-4 Laboratory Duplicate RPD for copper (48%) and nickel (35%), performed on L1739004-01, is outside the acceptance criteria. The elevated RPD has been attributed to the non-homogeneous nature of the native sample.

Total Organic Carbon

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Case Narrative (continued)

In reference to question H:

The WG1063324-1 Method Blank, associated with L1739004-01 through -14, has a concentration above the reporting limit. Since the associated sample concentrations are greater than 10x the blank concentration for this analyte, no corrective action is required.

The WG1063324-3 Laboratory Duplicate RPD (51%), performed on L1739004-01, is outside the acceptance criteria of 25%. The elevated RPD has been attributed to the non-homogeneous nature of the native sample.

The WG1063324-4 MS recovery (15%), performed on L1739004-01, does not apply because the sample concentration is greater than four times the spike amount added.

Acid Volatile Sulfide w/Simultaneously Extracted Metals

In reference to question H:

The WG1062896-3 MS recovery, performed on L1739004-01, is outside the acceptance criteria (0%); however, the associated LCS recovery is within criteria. No further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative

Date: 11/29/17

METALS



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-01 Date Collected: 10/26/17 13:35
Client ID: BS1A-102617-1335 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 63%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	2.08	mg/kg	0.023	0.003	5	11/02/17 15:50	11/16/17 09:02	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	35.6	mg/kg	0.779	0.779	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Barium, Total	69.1	mg/kg	4.67	4.67	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Cadmium, Total	0.3781	mg/kg	0.3115	0.3115	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Chromium, Total	366	mg/kg	3.12	3.12	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Copper, Total	419	mg/kg	3.12	3.12	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Lead, Total	819	mg/kg	0.934	0.934	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Nickel, Total	297	mg/kg	1.56	1.56	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.12	3.12	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Silver, Total	ND	mg/kg	0.779	0.779	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM
Zinc, Total	463	mg/kg	15.6	15.6	10	11/02/17 07:10	11/07/17 09:25	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	ND	umoles/gm	0.099	0.099	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	ND	umoles/g	0.001420	0.001420	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM
Copper, Total	1.92573	umoles/g	0.012558	0.012558	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM
Lead, Total	1.28629	umoles/g	0.007702	0.007702	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM
Nickel, Total	0.445673	umoles/g	0.027187	0.027187	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM
Zinc, Total	1.70670	umoles/g	0.024413	0.024413	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM
SEM/AVS Ratio	NA	-	0	NA	5	11/09/17 10:30	11/14/17 11:48	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-02 Date Collected: 10/26/17 12:15
Client ID: BS1B-102617-1215 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 43%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.844	mg/kg	0.036	0.005	5	11/02/17 15:50	11/16/17 09:05	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	18.8	mg/kg	1.14	1.14	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Barium, Total	112	mg/kg	6.85	6.85	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Cadmium, Total	1.369	mg/kg	0.4567	0.4567	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Chromium, Total	538	mg/kg	4.57	4.57	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Copper, Total	150	mg/kg	4.57	4.57	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Lead, Total	232	mg/kg	1.37	1.37	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Nickel, Total	39.6	mg/kg	2.28	2.28	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	4.57	4.57	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Silver, Total	ND	mg/kg	1.14	1.14	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM
Zinc, Total	271	mg/kg	22.8	22.8	10	11/02/17 07:10	11/07/17 09:29	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	28.8	umoles/gm	0.482	0.312	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	ND	umoles/g	0.006876	0.006876	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM
Copper, Total	0.468920	umoles/g	0.060821	0.060821	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM
Lead, Total	0.385676	umoles/g	0.037303	0.037303	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM
Nickel, Total	ND	umoles/g	0.131671	0.131671	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM
Zinc, Total	1.90962	umoles/g	0.118236	0.118236	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM
SEM/AVS Ratio	0.095980	-	-	NA	5	11/09/17 10:30	11/14/17 11:55	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-03 Date Collected: 10/26/17 12:05
Client ID: S5A1-102617-1205 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 69%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.293	mg/kg	0.022	0.003	5	11/02/17 15:50	11/16/17 08:55	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	27.3	mg/kg	0.700	0.700	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Barium, Total	46.4	mg/kg	4.20	4.20	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Cadmium, Total	ND	mg/kg	0.2800	0.2800	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Chromium, Total	144	mg/kg	2.80	2.80	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Copper, Total	202	mg/kg	2.80	2.80	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Lead, Total	622	mg/kg	0.840	0.840	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Nickel, Total	47.0	mg/kg	1.40	1.40	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	2.80	2.80	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Silver, Total	ND	mg/kg	0.700	0.700	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM
Zinc, Total	315	mg/kg	14.0	14.0	10	11/02/17 07:10	11/07/17 09:14	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	ND	umoles/gm	0.129	0.129	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	ND	umoles/g	0.001842	0.001842	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM
Copper, Total	1.09407	umoles/g	0.016292	0.016292	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM
Lead, Total	1.22339	umoles/g	0.009992	0.009992	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM
Nickel, Total	0.070978	umoles/g	0.035271	0.035271	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM
Zinc, Total	0.940910	umoles/g	0.031672	0.031672	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM
SEM/AVS Ratio	NA	-	0	NA	5	11/09/17 10:30	11/14/17 11:59	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-04 Date Collected: 10/26/17 11:25
Client ID: S5B1-102617-1125 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 54%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.43	mg/kg	0.023	0.003	5	11/02/17 15:50	11/16/17 09:07	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	25.5	mg/kg	0.914	0.914	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Barium, Total	88.8	mg/kg	5.48	5.48	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Cadmium, Total	2.458	mg/kg	0.3654	0.3654	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Chromium, Total	996	mg/kg	3.65	3.65	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Copper, Total	139	mg/kg	3.65	3.65	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Lead, Total	282	mg/kg	1.10	1.10	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Nickel, Total	31.5	mg/kg	1.83	1.83	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.65	3.65	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Silver, Total	2.54	mg/kg	0.914	0.914	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM
Zinc, Total	295	mg/kg	18.3	18.3	10	11/02/17 07:10	11/07/17 09:32	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	26.4	umoles/gm	0.231	0.231	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.008711	umoles/g	0.003287	0.003287	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM
Copper, Total	0.190574	umoles/g	0.029075	0.029075	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM
Lead, Total	0.584170	umoles/g	0.017832	0.017832	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM
Nickel, Total	0.068265	umoles/g	0.062945	0.062945	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM
Zinc, Total	2.05813	umoles/g	0.056522	0.056522	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM
SEM/AVS Ratio	0.110222	-	-	NA	5	11/09/17 10:30	11/14/17 12:03	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-05 Date Collected: 10/26/17 13:10
Client ID: S4A1-102617-1310 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 64%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.514	mg/kg	0.017	0.002	5	11/02/17 15:50	11/16/17 09:10	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	16.8	mg/kg	0.749	0.749	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Barium, Total	44.8	mg/kg	4.50	4.50	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Cadmium, Total	0.6652	mg/kg	0.2998	0.2998	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Chromium, Total	249	mg/kg	3.00	3.00	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Copper, Total	364	mg/kg	3.00	3.00	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Lead, Total	389	mg/kg	0.899	0.899	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Nickel, Total	34.1	mg/kg	1.50	1.50	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.00	3.00	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Silver, Total	0.779	mg/kg	0.749	0.749	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM
Zinc, Total	291	mg/kg	15.0	15.0	10	11/02/17 07:10	11/07/17 09:49	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	10.6	umoles/gm	0.198	0.198	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.004138	umoles/g	0.002819	0.002819	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM
Copper, Total	3.61259	umoles/g	0.024937	0.024937	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM
Lead, Total	1.78885	umoles/g	0.015294	0.015294	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM
Nickel, Total	0.208060	umoles/g	0.053986	0.053986	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM
Zinc, Total	3.00915	umoles/g	0.048477	0.048477	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM
SEM/AVS Ratio	0.813471	-	-	NA	5	11/09/17 10:30	11/14/17 12:07	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-06 Date Collected: 10/26/17 11:35
Client ID: S4B1-102617-1135 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 44%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	2.01	mg/kg	0.034	0.004	5	11/02/17 15:50	11/16/17 09:12	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	28.2	mg/kg	1.10	1.10	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Barium, Total	107	mg/kg	6.62	6.62	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Cadmium, Total	2.614	mg/kg	0.4416	0.4416	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Chromium, Total	1190	mg/kg	4.42	4.42	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Copper, Total	162	mg/kg	4.42	4.42	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Lead, Total	332	mg/kg	1.32	1.32	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Nickel, Total	38.8	mg/kg	2.21	2.21	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	4.42	4.42	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Silver, Total	3.56	mg/kg	1.10	1.10	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM
Zinc, Total	341	mg/kg	22.1	22.1	10	11/02/17 07:10	11/07/17 09:53	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	19.1	umoles/gm	0.201	0.201	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.009925	umoles/g	0.002863	0.002863	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM
Copper, Total	0.421287	umoles/g	0.025319	0.025319	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM
Lead, Total	0.653316	umoles/g	0.015529	0.015529	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM
Nickel, Total	0.139691	umoles/g	0.054813	0.054813	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM
Zinc, Total	2.88622	umoles/g	0.049220	0.049220	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM
SEM/AVS Ratio	0.215206	-	-	NA	5	11/09/17 14:00	11/14/17 12:10	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-07 Date Collected: 10/26/17 10:25
Client ID: S4C1-102617-1025 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 47%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.74	mg/kg	0.027	0.003	5	11/02/17 15:50	11/16/17 09:20	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	35.8	mg/kg	0.996	0.996	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Barium, Total	98.0	mg/kg	5.98	5.98	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Cadmium, Total	2.587	mg/kg	0.3985	0.3985	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Chromium, Total	1120	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Copper, Total	1210	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Lead, Total	389	mg/kg	1.20	1.20	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Nickel, Total	41.7	mg/kg	1.99	1.99	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Silver, Total	4.03	mg/kg	0.996	0.996	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM
Zinc, Total	310	mg/kg	19.9	19.9	10	11/02/17 07:10	11/07/17 09:57	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	42.6	umoles/gm	0.174	0.174	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.012830	umoles/g	0.002487	0.002487	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM
Copper, Total	0.554715	umoles/g	0.021994	0.021994	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM
Lead, Total	0.853123	umoles/g	0.013490	0.013490	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM
Nickel, Total	0.136344	umoles/g	0.047616	0.047616	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM
Zinc, Total	2.90506	umoles/g	0.042757	0.042757	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM
SEM/AVS Ratio	0.104744	-	-	NA	5	11/09/17 14:00	11/14/17 12:26	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-08 Date Collected: 10/26/17 11:50
Client ID: S3A1-102617-1150 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 57%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.588	mg/kg	0.024	0.003	5	11/02/17 15:50	11/16/17 09:22	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	27.2	mg/kg	0.860	0.860	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Barium, Total	47.5	mg/kg	5.16	5.16	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Cadmium, Total	0.7587	mg/kg	0.3439	0.3439	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Chromium, Total	386	mg/kg	3.44	3.44	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Copper, Total	162	mg/kg	3.44	3.44	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Lead, Total	305	mg/kg	1.03	1.03	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Nickel, Total	34.2	mg/kg	1.72	1.72	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.44	3.44	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Silver, Total	1.22	mg/kg	0.860	0.860	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM
Zinc, Total	337	mg/kg	17.2	17.2	10	11/02/17 07:10	11/07/17 10:01	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	7.26	umoles/gm	0.171	0.171	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.004623	umoles/g	0.002438	0.002438	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM
Copper, Total	3.78560	umoles/g	0.021563	0.021563	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM
Lead, Total	1.06253	umoles/g	0.013225	0.013225	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM
Nickel, Total	0.128720	umoles/g	0.046682	0.046682	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM
Zinc, Total	2.56400	umoles/g	0.041919	0.041919	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM
SEM/AVS Ratio	1.03932	-	-	NA	5	11/09/17 14:00	11/14/17 12:29	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-09 Date Collected: 10/26/17 11:05
Client ID: S3B1-102617-1105 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 49%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.90	mg/kg	0.024	0.003	5	11/02/17 15:50	11/16/17 09:25	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	30.9	mg/kg	0.994	0.994	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Barium, Total	106	mg/kg	5.96	5.96	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Cadmium, Total	2.999	mg/kg	0.3975	0.3975	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Chromium, Total	1110	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Copper, Total	133	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Lead, Total	300	mg/kg	1.19	1.19	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Nickel, Total	32.7	mg/kg	1.99	1.99	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.98	3.98	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Silver, Total	3.22	mg/kg	0.994	0.994	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM
Zinc, Total	336	mg/kg	19.9	19.9	10	11/02/17 07:10	11/07/17 10:05	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	20.4	umoles/gm	0.201	0.201	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.012256	umoles/g	0.002865	0.002865	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM
Copper, Total	0.380760	umoles/g	0.025339	0.025339	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM
Lead, Total	1.03099	umoles/g	0.015541	0.015541	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM
Nickel, Total	0.149253	umoles/g	0.054856	0.054856	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM
Zinc, Total	2.94303	umoles/g	0.049259	0.049259	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM
SEM/AVS Ratio	0.221387	-	-	NA	5	11/09/17 14:00	11/14/17 12:33	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-10
Client ID: S3C1-102617-1010
Sample Location: BEVERLY, MA
Matrix: Soil
Percent Solids: 48%

Date Collected: 10/26/17 10:10
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.73	mg/kg	0.022	0.003	5	11/02/17 15:50	11/16/17 09:27	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	29.2	mg/kg	0.994	0.994	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Barium, Total	108	mg/kg	5.96	5.96	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Cadmium, Total	2.738	mg/kg	0.3974	0.3974	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Chromium, Total	1120	mg/kg	3.97	3.97	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Copper, Total	139	mg/kg	3.97	3.97	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Lead, Total	303	mg/kg	1.19	1.19	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Nickel, Total	34.3	mg/kg	1.99	1.99	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.97	3.97	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Silver, Total	3.80	mg/kg	0.994	0.994	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM
Zinc, Total	324	mg/kg	19.9	19.9	10	11/02/17 07:10	11/07/17 10:08	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	39.4	umoles/gm	0.216	0.216	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.019741	umoles/g	0.003081	0.003081	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM
Copper, Total	1.44797	umoles/g	0.027255	0.027255	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM
Lead, Total	1.71582	umoles/g	0.016716	0.016716	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM
Nickel, Total	0.213855	umoles/g	0.059005	0.059005	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM
Zinc, Total	3.85645	umoles/g	0.052984	0.052984	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM
SEM/AVS Ratio	0.184107	-	-	NA	5	11/09/17 14:00	11/14/17 12:37	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-11 Date Collected: 10/26/17 10:50
Client ID: S2B1-102617-1050 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 49%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.53	mg/kg	0.030	0.004	5	11/02/17 15:50	11/16/17 09:30	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	27.5	mg/kg	0.974	0.974	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Barium, Total	83.0	mg/kg	5.84	5.84	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Cadmium, Total	2.302	mg/kg	0.3897	0.3897	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Chromium, Total	860	mg/kg	3.90	3.90	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Copper, Total	124	mg/kg	3.90	3.90	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Lead, Total	302	mg/kg	1.17	1.17	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Nickel, Total	33.6	mg/kg	1.95	1.95	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.90	3.90	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Silver, Total	2.78	mg/kg	0.974	0.974	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM
Zinc, Total	327	mg/kg	19.5	19.5	10	11/02/17 07:10	11/07/17 10:12	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	20.4	umoles/gm	0.204	0.204	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.019315	umoles/g	0.002906	0.002906	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM
Copper, Total	0.754813	umoles/g	0.025701	0.025701	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM
Lead, Total	1.39076	umoles/g	0.015763	0.015763	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM
Nickel, Total	0.139964	umoles/g	0.055640	0.055640	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM
Zinc, Total	4.54865	umoles/g	0.049963	0.049963	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM
SEM/AVS Ratio	0.335956	-	-	NA	5	11/09/17 14:00	11/14/17 12:41	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-12 Date Collected: 10/26/17 09:30
Client ID: S1A1-102617-0930 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 57%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.10	mg/kg	0.020	0.003	5	11/02/17 15:50	11/16/17 09:32	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	24.2	mg/kg	0.852	0.852	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Barium, Total	77.3	mg/kg	5.11	5.11	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Cadmium, Total	1.818	mg/kg	0.3408	0.3408	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Chromium, Total	801	mg/kg	3.41	3.41	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Copper, Total	129	mg/kg	3.41	3.41	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Lead, Total	264	mg/kg	1.02	1.02	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Nickel, Total	34.7	mg/kg	1.70	1.70	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.41	3.41	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Silver, Total	3.31	mg/kg	0.852	0.852	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM
Zinc, Total	290	mg/kg	17.0	17.0	10	11/02/17 07:10	11/07/17 10:16	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	18.4	umoles/gm	0.167	0.167	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.016489	umoles/g	0.002388	0.002388	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM
Copper, Total	0.807233	umoles/g	0.021124	0.021124	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM
Lead, Total	1.40427	umoles/g	0.012956	0.012956	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM
Nickel, Total	0.135595	umoles/g	0.045731	0.045731	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM
Zinc, Total	3.64392	umoles/g	0.041064	0.041064	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM
SEM/AVS Ratio	0.326495	-	-	NA	5	11/09/17 14:00	11/14/17 12:45	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-13 Date Collected: 10/26/17 09:45
Client ID: S1B1-102617-0945 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 48%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	2.30	mg/kg	0.027	0.003	5	11/02/17 15:50	11/16/17 09:35	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	36.1	mg/kg	1.01	1.01	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Barium, Total	72.8	mg/kg	6.06	6.06	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Cadmium, Total	1.448	mg/kg	0.4040	0.4040	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Chromium, Total	637	mg/kg	4.04	4.04	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Copper, Total	121	mg/kg	4.04	4.04	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Lead, Total	237	mg/kg	1.21	1.21	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Nickel, Total	27.4	mg/kg	2.02	2.02	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	4.04	4.04	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Silver, Total	1.99	mg/kg	1.01	1.01	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM
Zinc, Total	338	mg/kg	20.2	20.2	10	11/02/17 07:10	11/07/17 10:20	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	12.2	umoles/gm	0.207	0.207	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.015306	umoles/g	0.002953	0.002953	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM
Copper, Total	1.15015	umoles/g	0.026121	0.026121	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM
Lead, Total	1.37599	umoles/g	0.016021	0.016021	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM
Nickel, Total	0.175179	umoles/g	0.056550	0.056550	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM
Zinc, Total	4.71453	umoles/g	0.050780	0.050780	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM
SEM/AVS Ratio	0.609111	-	-	NA	5	11/09/17 14:00	11/14/17 12:48	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-14 Date Collected: 10/26/17 09:15
Client ID: S2A1-102617-0915 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 69%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.381	mg/kg	0.017	0.002	5	11/02/17 15:50	11/16/17 09:37	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	39.5	mg/kg	0.684	0.684	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Barium, Total	35.9	mg/kg	4.10	4.10	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Cadmium, Total	0.4788	mg/kg	0.2736	0.2736	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Chromium, Total	247	mg/kg	2.74	2.74	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Copper, Total	166	mg/kg	2.74	2.74	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Lead, Total	264	mg/kg	0.821	0.821	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Nickel, Total	27.3	mg/kg	1.37	1.37	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	2.74	2.74	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Silver, Total	0.913	mg/kg	0.684	0.684	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM
Zinc, Total	265	mg/kg	13.7	13.7	10	11/02/17 07:10	11/07/17 10:23	EPA 3050B	97,6020A	AM

Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab

Sulfide, Acid Volatile	ND	umoles/gm	0.119	0.119	1	11/09/17 10:00	36,-	36,-	CA	
Cadmium, Total	0.003316	umoles/g	0.00170	0.001700	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM
Copper, Total	1.14968	umoles/g	0.015034	0.015034	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM
Lead, Total	0.798514	umoles/g	0.009221	0.009221	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM
Nickel, Total	0.106276	umoles/g	0.032547	0.032547	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM
Zinc, Total	2.30384	umoles/g	0.029226	0.029226	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM
SEM/AVS Ratio	NA	-	0	NA	5	11/09/17 14:00	11/14/17 12:52	36,-	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-15 Date Collected: 10/26/17 00:00
Client ID: BS1A-102617-0002 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 69%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	1.29	mg/kg	0.021	0.003	5	11/02/17 15:50	11/16/17 09:40	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	34.0	mg/kg	0.716	0.716	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Barium, Total	72.8	mg/kg	4.30	4.30	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Cadmium, Total	0.4086	mg/kg	0.2866	0.2866	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Chromium, Total	320	mg/kg	2.87	2.87	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Copper, Total	516	mg/kg	2.87	2.87	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Lead, Total	777	mg/kg	0.860	0.860	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Nickel, Total	288	mg/kg	1.43	1.43	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	2.87	2.87	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Silver, Total	ND	mg/kg	0.716	0.716	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM
Zinc, Total	498	mg/kg	14.3	14.3	10	11/02/17 07:10	11/07/17 10:35	EPA 3050B	97,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-16 Date Collected: 10/26/17 00:00
Client ID: S4A1-102617-0001 Date Received: 10/26/17
Sample Location: BEVERLY, MA Field Prep: Not Specified
Matrix: Soil
Percent Solids: 61%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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Total Metals - Mansfield Lab

Mercury, Total	0.286	mg/kg	0.024	0.003	5	11/02/17 15:50	11/16/17 09:42	EPA 7474	1,7474	BV
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MCP Total Metals - Mansfield Lab

Arsenic, Total	19.1	mg/kg	0.805	0.805	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Barium, Total	48.0	mg/kg	4.83	4.83	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Cadmium, Total	0.5879	mg/kg	0.3219	0.3219	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Chromium, Total	165	mg/kg	3.22	3.22	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Copper, Total	1360	mg/kg	3.22	3.22	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Lead, Total	385	mg/kg	0.966	0.966	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Nickel, Total	44.3	mg/kg	1.61	1.61	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Selenium, Total	ND	mg/kg	3.22	3.22	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Silver, Total	0.863	mg/kg	0.805	0.805	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM
Zinc, Total	286	mg/kg	16.1	16.1	10	11/02/17 07:10	11/07/17 10:39	EPA 3050B	97,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 01-16 Batch: WG1058534-1									
Arsenic, Total	ND	mg/kg	0.500	0.500	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Barium, Total	ND	mg/kg	3.00	3.00	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Cadmium, Total	ND	mg/kg	0.2000	0.2000	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Chromium, Total	ND	mg/kg	2.00	2.00	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Copper, Total	ND	mg/kg	2.00	2.00	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Lead, Total	ND	mg/kg	0.600	0.600	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Nickel, Total	ND	mg/kg	1.00	1.00	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Selenium, Total	ND	mg/kg	2.00	2.00	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Silver, Total	ND	mg/kg	0.500	0.500	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM
Zinc, Total	ND	mg/kg	10.0	10.0	10	11/02/17 07:10	11/07/17 09:02	97,6020A	AM

Prep Information

Digestion Method: EPA 3050B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst	
Total Metals - Mansfield Lab for sample(s): 01-16 Batch: WG1058535-1										
Mercury, Total	0.003	J	mg/kg	0.013	0.002	5	11/02/17 15:50	11/16/17 08:50	1,7474	BV

Prep Information

Digestion Method: EPA 7474

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 01-14 Batch: WG1062398-1									
Cadmium, Total	ND	umoles/g	0.008897	0.008897	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Copper, Total	ND	umoles/g	0.078691	0.078691	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Lead, Total	ND	umoles/g	0.048263	0.048263	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Nickel, Total	ND	umoles/g	0.170358	0.170358	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM
Zinc, Total	ND	umoles/g	0.152975	0.152975	5	11/09/17 10:30	11/14/17 10:42	1,6020A	AM



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Method Blank Analysis Batch Quality Control

Prep Information

Digestion Method: 36,-

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab for sample(s): 01-14 Batch: WG1062896-1									
Sulfide, Acid Volatile	ND	umoles/gm	0.624	0.312	1		11/09/17 10:00	36,-	CA

Prep Information

Digestion Method: 36,-



Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-16 Batch: WG1058534-2 WG1058534-3 SRM Lot Number: D098-540								
Arsenic, Total	102		101		83-117	1		30
Barium, Total	102		96		82-118	6		30
Cadmium, Total	106		99		82-117	7		30
Chromium, Total	96		94		83-119	2		30
Copper, Total	98		96		84-116	2		30
Lead, Total	98		96		82-117	2		30
Nickel, Total	104		101		82-117	3		30
Selenium, Total	106		103		78-121	3		30
Silver, Total	102		99		80-120	3		30
Zinc, Total	102		100		81-119	2		30
Total Metals - Mansfield Lab Associated sample(s): 01-16 Batch: WG1058535-2 SRM Lot Number: D098-540								
Mercury, Total	80		-		50-149	-		20
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-14 Batch: WG1062398-2 SRM Lot Number: A2METSPIKE								
Cadmium, Total	102		-		80-120	-		20
Copper, Total	111		-		80-120	-		20
Lead, Total	96		-		80-120	-		20
Nickel, Total	99		-		80-120	-		20
Zinc, Total	111		-		80-120	-		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-14 Batch: WG1062896-2					
Sulfide, Acid Volatile	111	-	80-120	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-16 QC Batch ID: WG1058534-4 WG1058534-5 QC Sample: L1739004-03 Client ID: S5A1-102617-1205												
Barium, Total	46.4	225	284	106		298	112		75-125	5		35
Cadmium, Total	ND	5.73	6.717	117		6.609	116		75-125	2		35
Chromium, Total	144.	22.5	209	289	Q	172	125		75-125	19		35
Copper, Total	202.	28.1	230	100		212	36	Q	75-125	8		35
Lead, Total	622.	57.3	914	509	Q	806	322	Q	75-125	13		35
Nickel, Total	47.0	56.2	136	158	Q	108	109		75-125	23		35
Selenium, Total	ND	13.5	14.8	110		14.2	106		75-125	4		35
Silver, Total	ND	33.7	21.2	63	Q	20.6	61	Q	75-125	3		35
Zinc, Total	315.	56.2	458	254	Q	514	355	Q	75-125	12		35
Total Metals - Mansfield Lab Associated sample(s): 01-16 QC Batch ID: WG1058535-4 WG1058535-5 QC Sample: L1739004-03 Client ID: S5A1-102617-1205												
Mercury, Total	0.293	1.08	1.24	88		1.23	87		80-120	1		20
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-14 QC Batch ID: WG1062398-3 QC Sample: L1739004-01 Client ID: BS1A-102617-1335												
Cadmium, Total	ND	0.035231316 7259786	0.033559	95		-	-		75-125	-		20
Copper, Total	1.92573	0.124645892 351275	2.17166	197	Q	-	-		75-125	-		20
Lead, Total	1.28629	0.191119691 119691	2.12531	439	Q	-	-		75-125	-		20
Nickel, Total	0.445673	0.134923339 011925	0.767698	239	Q	-	-		75-125	-		20
Zinc, Total	1.70670	0.605782469 022487	2.58255	145	Q	-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab Associated sample(s): 01-14 01 Client ID: BS1A-102617-1335									
Sulfide, Acid Volatile	ND	0.099	ND	0	Q	-	75-125	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab 01 Client ID: BS1A-102617-1335	Associated sample(s): 01-14	QC Batch ID: WG1062398-4	QC Sample: L1739004-			
Cadmium, Total	ND	ND	umoles/g	NC		20
Copper, Total	1.92573	3.13935	umoles/g	48	Q	20
Lead, Total	1.28629	1.56394	umoles/g	19		20
Nickel, Total	0.445673	0.637756	umoles/g	35	Q	20
Zinc, Total	1.70670	1.71566	umoles/g	1		20
Acid Volatile Sulfide w/Simultaneously Extracted Metals - Mansfield Lab 01 Client ID: BS1A-102617-1335	Associated sample(s): 01-14	QC Batch ID: WG1062896-4	QC Sample: L1739004-			
Sulfide, Acid Volatile	ND	ND	umoles/gm	NC		20

Project Name: BEVERLY USM
Project Number: 37713-002

**Lab Serial Dilution
Analysis
Batch Quality Control**

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	Serial Dilution	Units	% D	Qual	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-16 QC Batch ID: WG1058534-7 QC Sample: L1739004-03 Client ID: S5A1-102617-1205						
Chromium, Total	144.	145	mg/kg	1		10
Copper, Total	202.	195	mg/kg	3		10
Lead, Total	622.	543	mg/kg	13	Q	10

INORGANICS & MISCELLANEOUS



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-01
Client ID: BS1A-102617-1335
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 13:35
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.93		%	0.010	0.010	1	-	11/14/17 17:52	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	62.6		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-02
Client ID: BS1B-102617-1215
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 12:15
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.88		%	0.010	0.010	1	-	11/14/17 18:07	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	42.7		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-03
Client ID: S5A1-102617-1205
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 12:05
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	2.06		%	0.010	0.010	1	-	11/14/17 18:12	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	69.0		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-04
Client ID: S5B1-102617-1125
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 11:25
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	5.09		%	0.010	0.010	1	-	11/14/17 18:17	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	53.7		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-05
Client ID: S4A1-102617-1310
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 13:10
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	2.07		%	0.010	0.010	1	-	11/14/17 18:22	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	64.4		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-06
Client ID: S4B1-102617-1135
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 11:35
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.06		%	0.010	0.010	1	-	11/14/17 18:27	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	44.4		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-07
Client ID: S4C1-102617-1025
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 10:25
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.59		%	0.010	0.010	1	-	11/14/17 18:31	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	47.2		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-08
Client ID: S3A1-102617-1150
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 11:50
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.09		%	0.010	0.010	1	-	11/14/17 18:36	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	57.2		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-09
Client ID: S3B1-102617-1105
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 11:05
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	5.85		%	0.010	0.010	1	-	11/14/17 19:27	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	48.6		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-10
Client ID: S3C1-102617-1010
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 10:10
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.93		%	0.010	0.010	1	-	11/14/17 19:32	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	48.2		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-11
Client ID: S2B1-102617-1050
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 10:50
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.54		%	0.010	0.010	1	-	11/14/17 19:37	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	48.6		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-12
Client ID: S1A1-102617-0930
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 09:30
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	3.94		%	0.010	0.010	1	-	11/14/17 19:42	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	57.4		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-13
Client ID: S1B1-102617-0945
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 09:45
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	4.93		%	0.010	0.010	1	-	11/14/17 19:47	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	48.2		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-14
Client ID: S2A1-102617-0915
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 09:15
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon	2.43		%	0.010	0.010	1	-	11/14/17 19:52	1,9060A	LC
General Chemistry - Mansfield Lab										
Solids, Total	68.6		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-15
Client ID: BS1A-102617-0002
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 00:00
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	68.9		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

SAMPLE RESULTS

Lab ID: L1739004-16
Client ID: S4A1-102617-0001
Sample Location: BEVERLY, MA
Matrix: Soil

Date Collected: 10/26/17 00:00
Date Received: 10/26/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	61.3		%	0.100	0.100	1	-	11/10/17 11:05	121,2540G	SP



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Method Blank Analysis
Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab for sample(s): 01-14 Batch: WG1063324-1									
Total Organic Carbon	0.015	%	0.010	0.010	1	-	11/14/17 19:22	1,9060A	LC



Lab Control Sample Analysis

Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	LCS	LCSD	%Recovery		RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual			
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-14 Batch: WG1063324-2							
Total Organic Carbon	95	-	-	75-125	-	-	25

Matrix Spike Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	Recovery Qual Limits	RPD Qual	RPD Qual Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-14 QC Batch ID: WG1063324-4 QC Sample: L1739004-01 Client ID: BS1A-102617-1335										
Total Organic Carbon	4.93	1.14	5.10	15	Q	-	-	75-125	-	25

Lab Duplicate Analysis
Batch Quality Control

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01-16 QC Batch ID: WG1061649-1 QC Sample: L1739004-03 Client ID: S5A1-102617-1205						
Solids, Total	69.0	62.6	%	10		10
Total Organic Carbon - Mansfield Lab Associated sample(s): 01-14 QC Batch ID: WG1063324-3 QC Sample: L1739004-01 Client ID: BS1A-102617-1335						
Total Organic Carbon	4.93	2.94	%	51	Q	25

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:11291719:11
Lab Number: L1739004
Report Date: 11/29/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent
B	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-01A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-01B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-01C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)
L1739004-01D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-01E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-02A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-02B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-02C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)
L1739004-02D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-02E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:11291719:11
Lab Number: L1739004
Report Date: 11/29/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-03A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-03B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-03B1	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-03B2	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-03C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)
L1739004-03D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-03E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-03F	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-AVS(14)
L1739004-03G	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-AVS(14)
L1739004-04A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-04B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-04C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-04D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-04E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-05A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-05B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-05C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-05D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-05E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-06A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-06B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-06C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-06D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-06E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-07A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:11291719:11
Lab Number: L1739004
Report Date: 11/29/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-07B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-07C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)
L1739004-07D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-07E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-08A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-08B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-08C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)
L1739004-08D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-08E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-09A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-09B	Glass 60mL/2oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-09C	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-TOC-9060(28)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:11291719:11
Lab Number: L1739004
Report Date: 11/29/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-09D	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-09E	Vial Large Septa unpreserved (4oz)	B	NA		2.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-10A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-10B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-10C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-10D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-10E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-11A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-11B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-11C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-11D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-11E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-12A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Serial_No:11291719:11
Lab Number: L1739004
Report Date: 11/29/17

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-12B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-12C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-12D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-12E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-13A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-13B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-13C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)
L1739004-13D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-13E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-14A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-14B	Glass 60mL/2oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-14C	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-TOC-9060(28)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1739004-14D	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-14E	Vial Large Septa unpreserved (4oz)	A	NA		3.7	Y	Absent		A2-CU-SEM(14),A2-CD-SEM(14),A2-AVS(14),A2-SEM/AVSRATIO(14),A2-NI-SEM(14),A2-PB-SEM(14),A2-ZN-SEM(14)
L1739004-15A	Plastic 2oz unpreserved for TS	B	NA		2.7	Y	Absent		A2-TS(7)
L1739004-15B	Glass 120ml/4oz unpreserved	B	NA		2.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)
L1739004-16A	Plastic 2oz unpreserved for TS	A	NA		3.7	Y	Absent		A2-TS(7)
L1739004-16B	Glass 120ml/4oz unpreserved	A	NA		3.7	Y	Absent		A2-BA-MCP6020T-10(180),A2-CR-MCP6020T-10(180),A2-HG-7474T(28),A2-AG-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-SE-MCP6020T-10(180),A2-HGPREP-AA(28),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180),A2-PREP-3050:1T(180)

*Values in parentheses indicate holding time in days

Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
Report Date: 11/29/17

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

- Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.
- Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.
- Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.
- Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.
- Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A - Spectra identified as "Aldol Condensation Product".
- B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers



Project Name: BEVERLY USM
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Report Date: 11/29/17

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedances are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers



Project Name: BEVERLY USM
Project Number: 37713-002

Lab Number: L1739004
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REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 36 Draft Analytical Method for Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment. PB93-155901, 1991.
- 97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at its own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility

EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO₂, NO₃.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility

SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water

EPA 300.0: Nitrate-N, Fluoride, Sulfate; EPA 353.2: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C**, **SM4500CN-CE**, **EPA 180.1**, **SM2130B**, **SM4500CI-D**, **SM2320B**, **SM2540C**, **SM4500H-B**
EPA 332: Perchlorate; EPA 524.2: THMs and VOCs; **EPA 504.1**: EDB, DBCP.
Microbiology: **SM9215B**; **SM9223-P/A**, **SM9223B-Colilert-QT**,**SM9222D**.

Non-Potable Water

SM4500H,B, **EPA 120.1**, **SM2510B**, **SM2540C**, **SM2320B**, **SM4500CL-E**, **SM4500F-BC**, **SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, LACHAT 10-107-06-1-B: Ammonia-N, **SM4500NO3-F**, **EPA 353.2**: Nitrate-N, **EPA 351.1**, **SM4500P-E**, **SM4500P-B**, **E**, **SM4500SO4-E**, **SM5220D**, **EPA 410.4**, **SM5210B**, **SM5310C**, **SM4500CL-D**, **EPA 1664**, **EPA 420.1**, **SM4500-CN-CE**, **SM2540D**.
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT**; **Enterolert-QT**, **SM9221E**.

Mansfield Facility:

Drinking Water

EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8**: Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1 Hg**.

Non-Potable Water

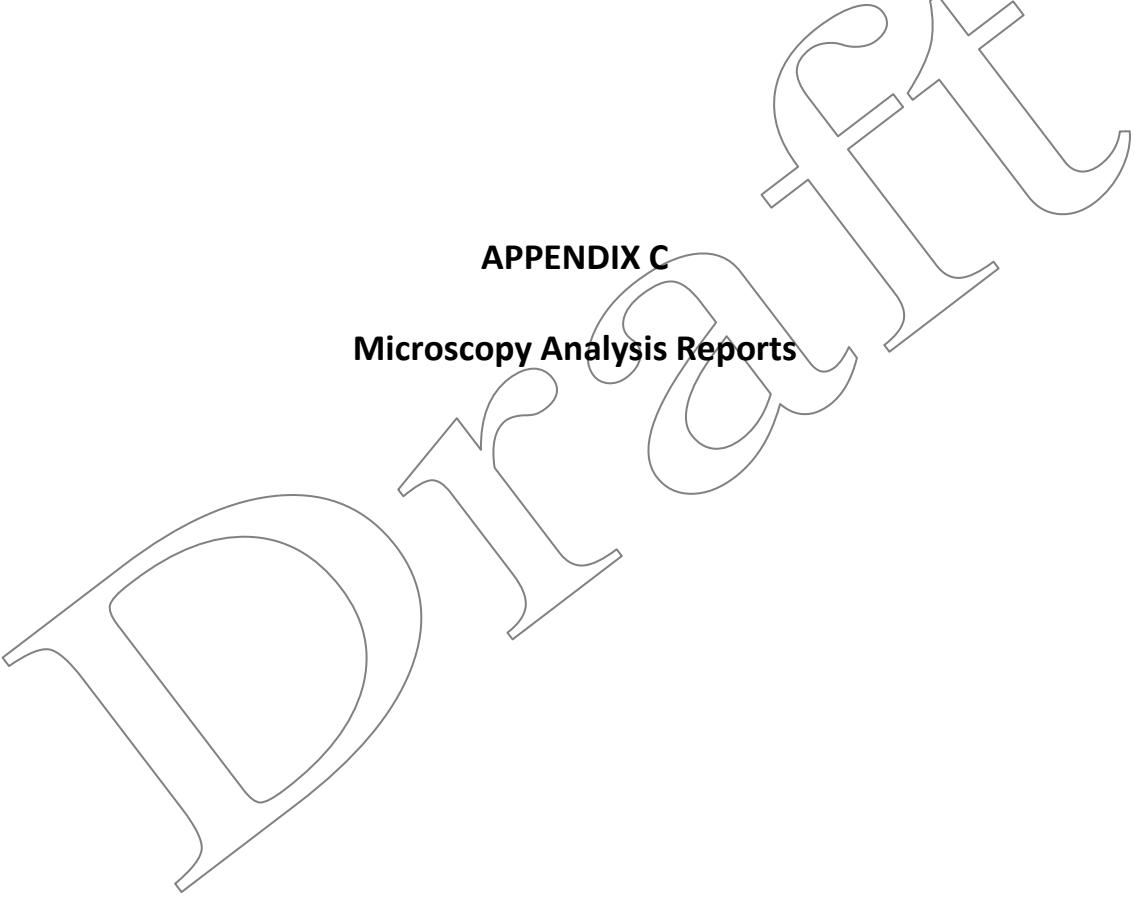
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY	Service Centers		Page 1 of 3	Date Rec'd in Lab 10/27/17	ALPHA Job # 4739004								
	Brewer, ME 04412	Portsmouth, NH 03801 Mahwah, NJ 07430											
	Albany, NY 12205	Torawanda, NY 14150 Holmes, PA 19043											
Westborough, MA 01581 8 Walkup Dr.	Mansfield, MA 02048 320 Forbes Blvd	Project Information		Deliverables									
TEL: 508-898-9220	TEL: 508-822-9300	Project Name: Beverly USM		<input checked="" type="checkbox"/> Email	<input type="checkbox"/> Fax								
FAX: 508-898-9193		Project Location: Beverly MA		<input type="checkbox"/> EQuIS (1 File)	<input checked="" type="checkbox"/> EQuIS (4 File)								
H&A Information		Project #: 37713-002		<input type="checkbox"/> Other:									
H&A Client: Stop & Shop		(Use Project name as Project #) <input type="checkbox"/>		Billing Information									
H&A Address: 465 Medford Street		Project Manager: J. Sweet		<input type="checkbox"/> Same as Client Info									
Boston, MA 02129		ALPHAQuote #:		PO #									
H&A Phone: 617-886-7400		Turn-Around Time											
H&A Fax:		Standard <input checked="" type="checkbox"/>	Due Date:										
H&A Email: Kalepidis, Esteinberg		Rush (only if pre approved) <input type="checkbox"/>	# of Days: 5 Day										
These samples have been previously analyzed by Alpha <input type="checkbox"/>				Disposal Site Information									
Other project specific requirements/comments: See project-specific QAPP				Please identify below location of applicable disposal facilities.									
Please specify Metals or TAL.				Disposal Facility: <input type="checkbox"/> NJ <input type="checkbox"/> NY <input type="checkbox"/> Other									
ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	ANALYSIS						Sample Filtration	
		Date	Time			1. RCRA 8 metals	2. Copper, Nickel, Zinc	3. AVS/SEM	TOC	<input type="checkbox"/> Lab to do	<input type="checkbox"/> Lab to do		
34604-01	BS1A-102617-1335	10/26/17	1325	SED	SC/LRS	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
02	BS1B-102617-1215	10/26/17	1215	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
03	S5A1-102617-1205	10/26/17	1205	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
04	S5B1-102617-1125		1125	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
05	S4A1-102617-1310		1310	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
06	S4B1-102617-1135		1135	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
07	S4C1-102617-1025		1025	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
08	S3A1-102617-1150		1150	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
09	S3B1-102617-1105	V	1105	SED	SC	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
10	S3C1-102617-1010		1010	SED	SC/LRS	X	X	X	X	<input checked="" type="checkbox"/> SEM/EDS	<input checked="" type="checkbox"/> SEM/EDS		<input type="checkbox"/> Lab to do
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃		Container Code: P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type		A A A		A A A		Sample Specific Comments	
						Preservative		A A A		A A A			
Relinquished By: Steve Clough H&A JRC		Date/Time 10/26/17 1415		Received By: AA		Date/Time 10/26/17 1415							
Other		10/26/17 1600		D. M. Matt		10/26/17 16:09							
Document ID: 20455 Rev 1 (1/28/2016)		Other		10/27/17 0640		MCB				10/27/17 0640			
Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.													

CHAIN OF CUSTODY		Service Centers		Page		Date Rec'd in Lab		ALPHA Job #					
		Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430 Albany, NY 12205 Tonawanda, NY 14150 Holmes, PA 19043		2 of 3		10/27/17		L1739004					
Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		Mansfield, MA 02048 320 Forbes Blvd. TEL: 508-822-9300 FAX: 508-822-3268		Project Information		Deliverables		Billing Information					
		Project Name: Beverly USM		<input checked="" type="checkbox"/> Email <input type="checkbox"/> Fax <input type="checkbox"/> EQuIS (1 File) <input checked="" type="checkbox"/> EQuIS (4 File) <input type="checkbox"/> Other:				<input type="checkbox"/> Same as Client Info					
H&A Information		Project Location: Beverly MA											
H&A Client: Stop & Shop		Project # 37713-002				Regulatory Requirements (Program/Criteria)		Disposal Site Information					
H&A Address: 465 Medford Street Boston, MA 02129		Project Manager: J. Sweet		MA RCS-1				Please identify below location of applicable disposal facilities:					
H&A Phone: 617-886-7400		ALPHAQuote #:		EPA See Project QAPP				Disposal Facility:					
H&A Fax:		Turn-Around Time						<input type="checkbox"/> NJ <input type="checkbox"/> NY <input type="checkbox"/> Other:					
H&A Email: Kalepidis, Esteinberg		Standard <input checked="" type="checkbox"/> Due Date: Rush (only if pre approved) <input type="checkbox"/> # of Days: 5 Day				Note: Select State from menu & identify criteria.							
These samples have been previously analyzed by Alpha <input type="checkbox"/>						ANALYSIS		Sample Filtration					
Other project specific requirements/comments: See project-specific QAPP								<input type="checkbox"/> Done <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do <i>(Please Specify below)</i>					
Please specify Metals or TAL.								Sample Specific Comments					
ALPHA Lab ID (Lab Use Only)	Sample ID <i>CRS 10/26</i>	Collection		Sample Matrix	Sampler's Initials	1. RCRA 8 metals	2. Copper, Nickel, Zinc	3. AVS/SEM	TOC	Lead SEM/EDS	Hold Lead SEM/EDS	SEM/EDS	
		Date	Time										
BS1A-102617- <i>11</i>	<i>10/26/17</i>	SED	SC	X	X	X	X	X	X				
S2B1-102617-1050 <i>12</i>	<i>10/26/17</i>	1050	SED	SC/c2s	X	X	X	X	X				
S1A1-102617-0930 <i>13</i>	<i>10/26/17</i>	0930	SED	SC	X	X	X	X	X				
S1B1-102617-0945 <i>14</i>	<i>10/26/17</i>	0945	SED	SC	X	X	X	X	X				
R1B1-			SED	SC	X	X	X						
R2A1-			SED	SC	X	X	X						
R2B1-			SED	SC	X	X	X						
R3A1-			SED	SC	X	X	X						
R3B1-			SED	SC	X	X	X						
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃ K/E = Zn Ac/NaOH O = Other		Container Code P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type						Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.	
						Preservative							
		Relinquished By:		Date/Time		Received By:		Date/Time					
		Steve Clough H&A <i>SC</i>		<i>10/26/17 1415</i>		Paula Matt <i>PM</i>		<i>10/26/17 1416</i>					
		AAC 10/26/17 1109				Diane Clark <i>DC</i>		10/26/17 1609					
		<i>THUR</i>		10/26/17 0640		Diane Clark <i>DC</i>		10/27/17 0640					

Service Centers			Page	Date Rec'd in Lab	ALPHA Job #				
Brewer, ME 04412	Portsmouth, NH 03801 Mahwah, NJ 07430		3 of 3	10/27/17	L1739004				
Albany, NY 12205									
Tonawanda, NY 14150	Holmes, PA 19043								
Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193	Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288	Project Information		Deliverables					
		Project Name: Beverly USM	<input checked="" type="checkbox"/> Email	<input type="checkbox"/> Fax	<input type="checkbox"/> Same as Client Info				
		Project Location: Beverly MA	<input type="checkbox"/> EQuIS (1 File)	<input checked="" type="checkbox"/> EQuIS (4 File)	PO #				
		Project # 37713-002	<input type="checkbox"/> Other:						
H&A Information		(Use Project name as Project #) <input type="checkbox"/>		Regulatory Requirements (Program/Criteria)					
H&A Client: Stop & Shop				MA RCS-1					
H&A Address: 465 Medford Street Boston, MA 02129		Project Manager: J. Sweet		EPA See Project QAPP					
H&A Phone: 617-886-7400		Turn-Around Time		Please identify below location of applicable disposal facilities.					
H&A Fax:		Standard <input checked="" type="checkbox"/>	Due Date:	Disposal Facility:					
H&A Email: Kalepidis, Steinberg		Rush (only if pre approved) <input type="checkbox"/>	# of Days: 5 Day	<input type="checkbox"/> NJ <input type="checkbox"/> NY <input type="checkbox"/> Other:					
Note: Select State from menu & identify criteria.									
These samples have been previously analyzed by Alpha <input type="checkbox"/>									
Other project specific requirements/comments: See project-specific QAPP									
Please specify Metals or TAL.									
ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	ANALYSIS		Sample Filtration	
		Date	Time			1. RCRA 8 metals	2. Copper, Nickel, Zinc	3. AVS/SEM	<input type="checkbox"/> Done <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do
	BS1A-			SED	SC	X	X	X	(Please Specify below)
	R4B1-			SED	SC	X	X	X	
39004-15	BS1A-102617-0002	10/26/17	—	Sed	SC/crs	X	X	X	
10	SSA1-102617-0001	10/26/17	—	Sed	SC/crs	X	X	X	
03	SSA1-102617-MSD	10/26/17	1205			X	X	X	
03	SSA1-102617-MS	10/26/17	1205			X	X	X	
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃ K/E = Zn Ac/NaOH O = Other		Container Code P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other E = Encore D = BOD Bottle		Westboro: Certification No: MA935 Mansfield: Certification No: MA015		Container Type		Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.	
						Preservative			
Relinquished By: Steve Clough H&A		Date/Time 10/26/17 1415		Received By: D. M. M. 10/26/17 1416		Date/Time 10/26/17 1416			
Relinquished By: Steve Clough H&A		Date/Time 10/26/17 1609		Received By: D. M. M. 10/26/17 1609		Date/Time 10/26/17 1609			
Relinquished By: Steve Clough H&A		Date/Time 10/27/17 0940		Received By: D. M. M. 10/27/17 0940		Date/Time 10/27/17 0940			



APPENDIX C

Microscopy Analysis Reports



12/4/2017

Alpha Analytical

MicroVision Labs Red Lead/Lead Paint Report, Job # 11328
Client Project#: L1743553

Scope of Work:

This report covers the methods and findings of the Red Lead/Lead Paint analysis that MicroVision Laboratories, Inc. conducted on one (1) soil sample submitted for testing from project number L1743553. The purpose of this analysis was to determine if any red lead particles, lead paint chips, leaded glass, or other lead-bearing particles may be present in the submitted soil sample by use of a combination of microscopy techniques including macroscopic inspection and SEM/EDS.

Methods:

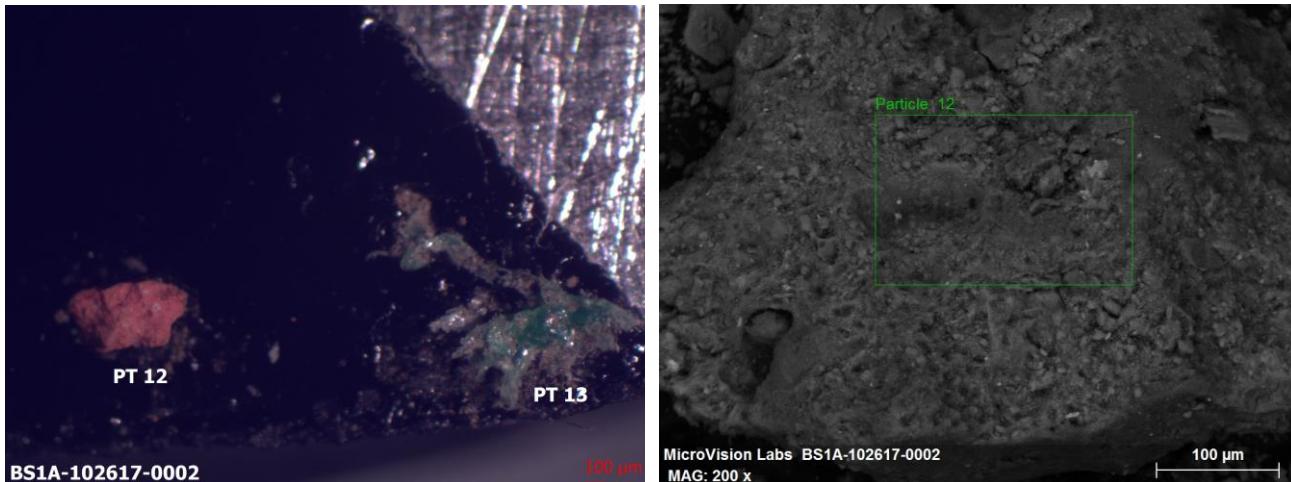
The sample was dried and examined by eye under the stereomicroscope for any suspect red or orange colored particles, any colored paint chips/flakes, glass particles, metallic particles or any other potentially lead-bearing particles. Suspect particles were separated from the soil sample and documented with optical images, then prepared for examination by Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the SEM examination, the suspect particles were mounted on an aluminum analysis stub with double sided adhesive tape and coated with evaporated graphite. Each of the suspect particles was examined in the SEM, and Backscatter Electron imaging (BSE) which correlates atomic density with image brightness was used to more readily detect the presence of heavy metals (including lead). EDS analysis was used to determine the elemental composition of the suspect particles. Representative digital images and EDS spectra were obtained and are presented on the following pages.

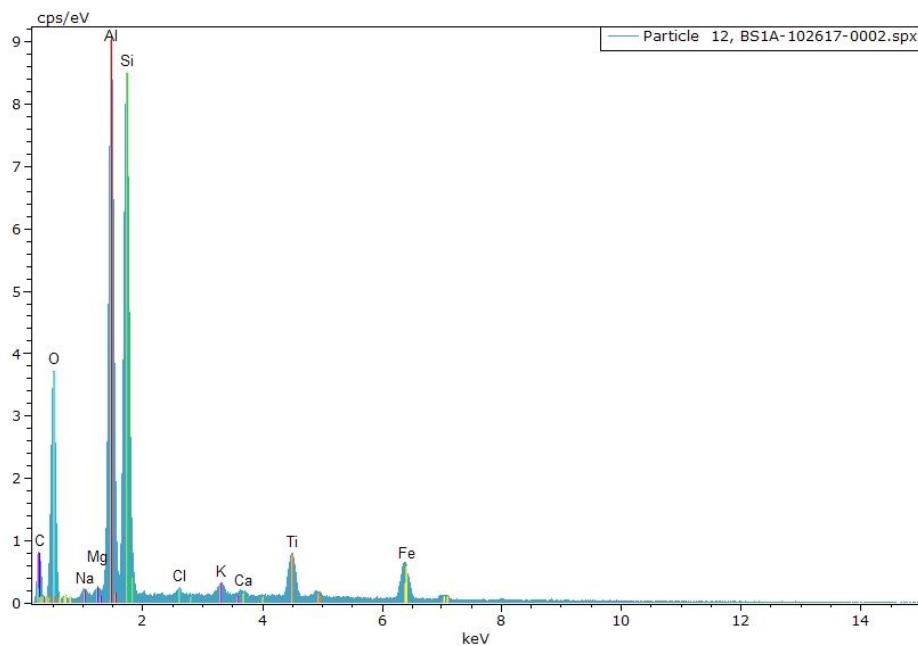
Sample: BS1A-102617-0002

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show an orange colored piece of brick detected in this soil sample, which did not contain lead. Instead, this particle was comprised primarily of aluminum and silicon (see EDS spectrum below).



Orange brick particle (PT 12)- Optical image (above left), SEM/BSE Image (above right), EDS Spectrum (below)



Results Summary Table:

Sample Name	Material Detected	Lead Concentration
BS1A-102617-0002	Orange Brick	None detected

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,



Audra Chaput
Analytical Microscopist

SUB Courier: Microvision -Chelmsford, Ma

1328

Page 4

ALPHA ANALYTICAL										CHAIN OF CUSTODY														
Project Information										PAGE 1 OF 1														
Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193					Mansfield, MA TEL: 508-822-9300 FAX: 508-822-3288					Project Name:					ALPHA Job #: L1743553									
Client Information										Report Information					Data Deliverables									
										<input type="checkbox"/> FAX					<input checked="" type="checkbox"/> E-MAIL									
										<input type="checkbox"/> ADEX					<input checked="" type="checkbox"/> Add'l Deliverables									
										<input type="checkbox"/> Same as Client Info					<input type="checkbox"/> PO #:									
Project Location: NY					Project#:					Regulatory Requirements/Report Limits					Billing Information									
Address: 320 Forbes Blvd. Mansfield, MA 02048					Project Manager: Gina Hall					State/Fed Program					Criteria									
Phone: 508-822-9300					ALPHA Quote #:					<input checked="" type="checkbox"/> Yes					<input type="checkbox"/> No									
Turn-Around Time										<input checked="" type="checkbox"/> MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS					Are MCP Analytical Methods Required?									
										<input type="checkbox"/> Yes					<input checked="" type="checkbox"/> No					<input type="checkbox"/> Are CT RCP (Reasonable Confidence Protocols) Required?				
										<input checked="" type="checkbox"/> Lead Paint/ Red Lead					<input type="checkbox"/> SAMPLE HANDLING									
															<input type="checkbox"/> Filtration									
															<input type="checkbox"/> Done									
															<input type="checkbox"/> #									
															<input type="checkbox"/> Not Needed									
															<input type="checkbox"/> Lab to do									
															<input type="checkbox"/> Preservation									
															<input type="checkbox"/> TO									
															<input type="checkbox"/> Lab to do (Please specify below)									
															<input type="checkbox"/> T									
															<input type="checkbox"/> L									
															<input type="checkbox"/> A									
															<input type="checkbox"/> S									
															<input type="checkbox"/> E									
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															<input type="checkbox"/> B									
															<input type="checkbox"/> D									
															<input type="checkbox"/> F									
															<input type="checkbox"/> H									
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															<input type="checkbox"/> J									
															<input type="checkbox"/> K									
															<input type="checkbox"/> L									
															<input type="checkbox"/> M									
															<input type="checkbox"/> N									
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															<input type="checkbox"/> Q									
															<input type="checkbox"/> R									
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															<input type="checkbox"/> W									
															<input type="checkbox"/> X									
															<input type="checkbox"/> Y									
															<input type="checkbox"/> Z									
PLEASE ANSWER QUESTIONS ABOVE!										Please print clearly, legibly and completely. Samples can not be logged in until turnaround time clock has started. All ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.														
IS YOUR PROJECT MA MCP or CT RCP?										Relinquished By: <i>Linda Hall</i> Date/Time: 11/25/17 2:19 Received By: <i>Linda Hall</i> Date/Time: 11/25/17 2:40 Comments: (None) Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com www.MicroVisionLabs.com														

ALPHA CHAIN OF CUSTODY		Service Centers		Page 3 of 3	Date Rec'd in Lab <i>10/27/17</i>	ALPHA Job # <i>L1739004</i>												
		Brewer, ME 04412	Portsmouth, NH 03801 Mahwah, NJ 07430															
Westborough, MA 01581 8 Walkup Dr. TEL: 508-898-9220 FAX: 508-898-9193		Mansfield, MA 02048 320 Forbes Blvd TEL: 508-822-9300 FAX: 508-822-3288		Project Information		Deliverables		Billing Information										
				Project Name: Beverly USM		<input checked="" type="checkbox"/> Email	<input type="checkbox"/> Fax	<input type="checkbox"/> Same as Client Info										
				Project Location: Beverly MA		<input type="checkbox"/> EQuIS (1 File)	<input checked="" type="checkbox"/> EQuIS (4 File)	PO #										
H&A Information		Project # 37713-002																
H&A Client: Stop & Shop		(Use Project name as Project #) <input type="checkbox"/>																
H&A Address: 465 Medford Street		Project Manager: J. Sweet																
Boston, MA 02129		ALPHAQuote #:																
H&A Phone: 617-886-7400		Turn-Around Time																
H&A Fax:		Standard <input checked="" type="checkbox"/>		Due Date:														
H&A Email: Kalepidis, Esteinberg		Rush (only if pre approved) <input type="checkbox"/>		# of Days: 5 Day														
These samples have been previously analyzed by Alpha <input type="checkbox"/>						Note: Select State from menu & identify criteria.												
Other project specific requirements/comments: See project-specific QAPP						ANALYSIS												
Please specify Metals or TAL.						Sample Filtration												
43553-01 <i>L1739004</i>	ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	1. RCHA 8 metals Copper, Nickel, Zinc etc	3. AVS/SEM	T/S	Done Lab to do Preservation Lab to do	Total Bottles (Specify below)							
			Date	Time														
			BS1A-									SED	SC	X	X	X		
			R4B1-									SED	SC	X	X	X		
			<i>10</i> BS1A-102617-0002	<i>10/26/17</i>								Sed	SC/crs	X	X	X	X	
			<i>10</i> S4A1-102617-0001	<i>10/26/17</i>								Sed	SC/crs	X	X	X		
			<i>10</i> S5A1-102617-MSD	<i>10/26/17</i>								1205		X	X	X		
<i>10</i> S5A1-102617-MS	<i>10/26/17</i>	1205		X	X	X												
Preservative Code: A = None B = HCl C = HNO ₃ D = H ₂ SO ₄ E = NaOH F = MeOH G = NaHSO ₄ H = Na ₂ S ₂ O ₃ K/E = Zn Ac/NaOH O = Other						Container Type				Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.								
Container Code: P = Plastic A = Amber Glass V = Vial G = Glass B = Bacteria Cup C = Cube O = Other						Preservative												
Westboro: Certification No: MA935 Mansfield: Certification No: MA015						Relinquished By:		Date/Time		Received By:		Date/Time						
						Steve Clough H&A <i>SC</i>		<i>10/26/17 1415</i>		J. Aal		<i>10/26/17 1416</i>						
						<i>SC</i>		<i>10/26/17 1609</i>		<i>J. Daniels/Moth</i>		<i>10/26/17 16:09</i>						
						<i>SC</i>		<i>10/27/17 0640</i>		<i>M. Baily</i>		<i>10/27/17 0640</i>						
Document ID: 20455 Rev 1 (1/28/2016)																		

SUB Courier: Microvision -Chelmsford, Ma



CHAIN OF CUSTODY

PAGE 1 OF 1

Westborough, MA **Mansfield, MA**
TEL: 508-898-9220 TEL: 508-822-9300
FAX: 508-898-9193 FAX: 508-822-3288

Client Information

Client: Alpha Analytical Lab

Address: 320 Forbes Blvd

Mansfield, Ma 02048

Phone: 508-822-9300

Project Information

Project Name:

Project Location: NY

Project #:

Project Manager: Gina Hall

ALPHA Quote #:

Turn-Around Time

Standard Rush (ONLY IF PRE APPROVED)

Fax

Email:
subreports@alphalab.com phall@alphalab.com

Due Date: 12/5/17

Time.

These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

Please include Alpha job #L1743553 on this report. Contact Gina Hall with Questions.

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

FORM NO. 01-01(0)
[Rev. 30-JUL-07]

SUB Courier: Microvision -Chelmsford, Ma

CHAIN OF CUSTODY

PAGE 1 OF 1



Westborough, MA **Mansfield, MA**
TEL: 508-898-9220 TEL: 508-822-9300
FAX: 508-898-9193 FAX: 508-822-3288

Client Information

Client: Alpha Analytical Lab

Address: 320 Forbes Blvd

Mansfield, Ma 02048

Phone: 508-822-9300

Project Information

Project Name:

Project Location: NY

Project #

Project Manager: Gina Hall

ALPHA Quote #

Turn-Around Time

Fax:

Standard Rush (ONLY IF PRE-APPROVED)

Email:

Due Date: 12/5/17 Time:

subreports@alphalab.com, ghan@alphalab.com

Other Project Specific Requirements/Comments/Detection Limits

Please include Alpha job #L1743553 on this report. Contact Gina Hall with Questions.

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Container Type	A	-	-	-	-	-	-	-	-	-	-	
Preservative	A	-	-	-	-	-	-	-	-	-	-	
By:	Date/Time	Received By:					Date/Time					
<i>M. S.</i>	<i>11/28/17 2109</i>	<i>O. J. S.</i>					<i>11/23/17 2040</i>					
<i>11/29/17 1004</i>	<i>O. J. S.</i>					<i>11/27/17 910</i>						
<i>Alpha Scientific</i>												



12/4/2017

Alpha Analytical

MicroVision Labs Red Lead/Lead Paint Report, Job # 11317 Client Project#: L1743341

Scope of Work:

This report covers the methods and findings of the Red Lead/Lead Paint analysis that MicroVision Laboratories, Inc. conducted on one (1) soil sample submitted for testing from project number L1743341. The purpose of this analysis was to determine if any red lead particles, lead paint chips, leaded glass, or other lead-bearing particles may be present in the submitted soil sample by use of a combination of microscopy techniques including macroscopic inspection and SEM/EDS.

Methods:

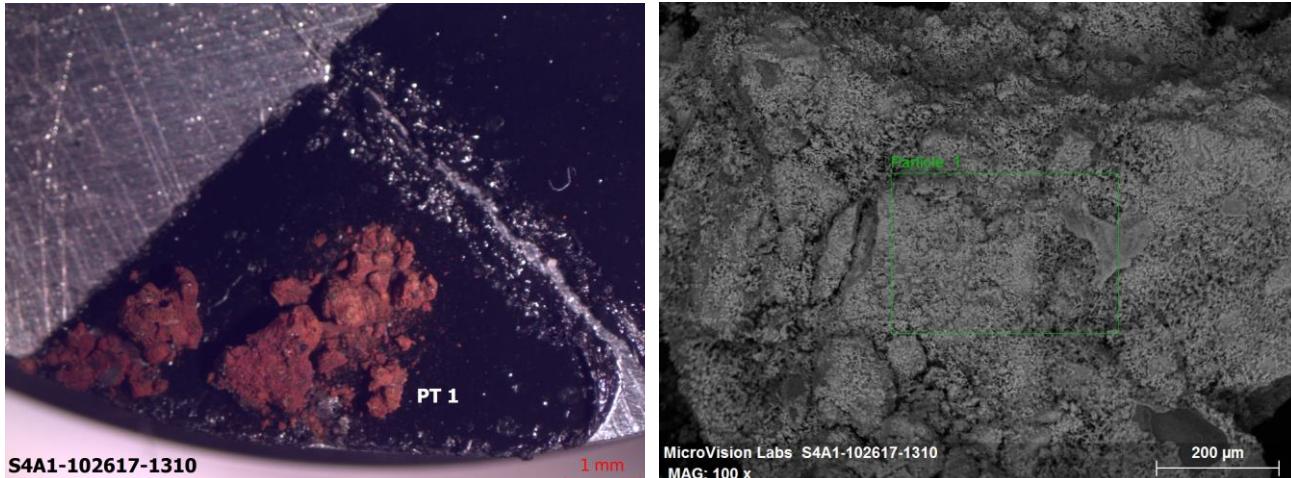
The sample was dried and examined by eye under the stereomicroscope for any suspect red or orange colored particles, any colored paint chips/flakes, glass particles, metallic particles or any other potentially lead-bearing particles. Suspect particles were separated from the soil sample and documented with optical images, then prepared for examination by Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the SEM examination, the suspect particles were mounted on an aluminum analysis stub with double sided adhesive tape and coated with evaporated graphite. Each of the suspect particles was examined in the SEM, and Backscatter Electron imaging (BSE) which correlates atomic density with image brightness was used to more readily detect the presence of heavy metals (including lead). EDS analysis was used to determine the elemental composition of the suspect particles. Representative digital images and EDS spectra were obtained and are presented on the following pages.

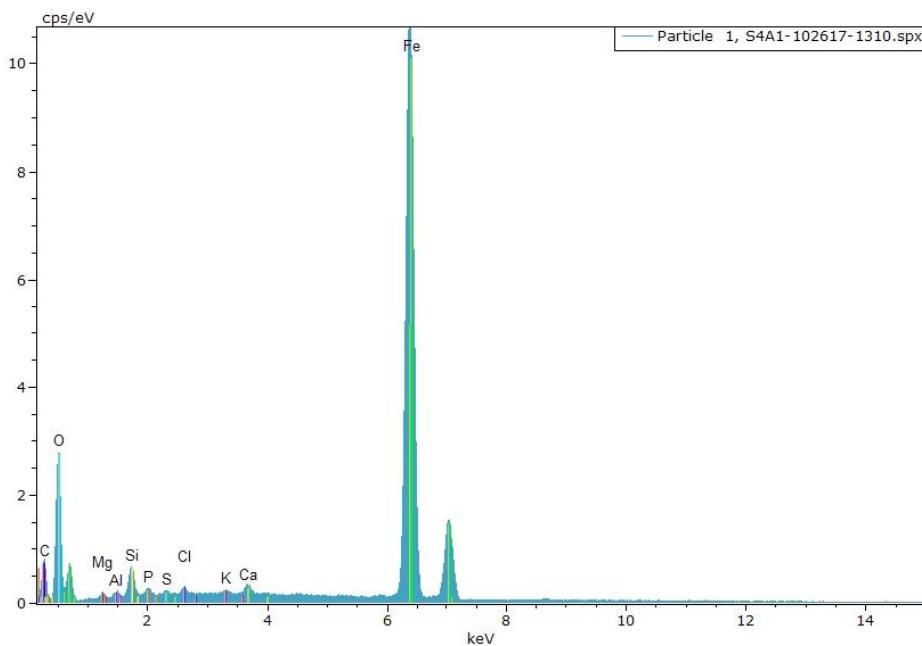
Sample: S4A1-102617-1310

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show a red colored particle detected in this soil sample, which did not contain lead. Instead, this particle was comprised primarily of iron and oxygen, which is consistent with rust (see EDS spectrum below).



**Red rust particle- Optical image (above left), SEM/BSE Image (above right),
EDS Spectrum (below)**



Results Summary Table:

Sample Name	Material Detected	Lead Concentration
S4A1-102617-1310	Rust (iron oxide)	None detected

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,



Audra Chaput
Analytical Microscopist

SUB Courier: Microvision

11317

Page 4

ALPHA ANALYTICAL		CHAIN OF CUSTODY																																																																																																																								
		Project Information					PAGE 1 OF 2																																																																																																																			
Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193		Mansfield, MA TEL: 508-822-5000 FAX: 508-822-3288		Client Information Client: Alpha Analytical Lab Address: 320 Forbes Blvd. Mansfield, MA 02048 Phone: 508-822-9300					Project Name: Project Location: Ma Project #: Project Manager: Gina Hall ALPHA Quote #: Turn-Around Time																																																																																																																	
Fax: Email: subreports@alphalab.com;ginahall@alphalab.com		Due Date: <input type="checkbox"/> Standard <input type="checkbox"/> Rush (ONLY IF PRE-APPROVED)		Time: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Are CT RCP (Reasonable Confidence Protocols) Required?					Report Information <input type="checkbox"/> FAX <input checked="" type="checkbox"/> E-MAIL <input type="checkbox"/> ADEX <input type="checkbox"/> Addl Deliverables																																																																																																																	
Other Project Specific Requirements/Comments/Detection Limits:		Regulatory Requirements/Report Limits State/Fed Program <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Criteria																																																																																																																								
<p>Please include Alpha job #L1739101 on this report.</p> <p>Contact Gina Hall with questions.</p>												MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Are MCP Analytical Methods Required?																																																																																																														
<p><i>Activated 11/27/17</i></p>												ANALYSIS Lead Paint /Red Lead HOLD																																																																																																														
<table border="1"> <thead> <tr> <th colspan="12">SAMPLE HANDLING</th> </tr> <tr> <th colspan="12">Filtration</th> </tr> <tr> <th colspan="12">#</th> </tr> <tr> <th colspan="12">Not Needed</th> </tr> <tr> <th colspan="12">Lab to do</th> </tr> <tr> <th colspan="12">Preservation</th> </tr> <tr> <th colspan="12">Lab to do</th> </tr> <tr> <th colspan="12">(Please specify below)</th> </tr> </thead> <tbody> <tr> <td colspan="12"> <input type="checkbox"/> A <input type="checkbox"/> L <input type="checkbox"/> B <input type="checkbox"/> O <input type="checkbox"/> T <input type="checkbox"/> S <input type="checkbox"/> E </td> </tr> </tbody> </table>												SAMPLE HANDLING												Filtration												#												Not Needed												Lab to do												Preservation												Lab to do												(Please specify below)												<input type="checkbox"/> A <input type="checkbox"/> L <input type="checkbox"/> B <input type="checkbox"/> O <input type="checkbox"/> T <input type="checkbox"/> S <input type="checkbox"/> E												Sample Specific Comments		
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<table border="1"> <thead> <tr> <th colspan="12">Date Rec'd in Lab:</th> </tr> <tr> <th colspan="12">ALPHA Job #: L1739101</th> </tr> <tr> <th colspan="12">Data Deliverables</th> </tr> <tr> <th colspan="12">Billing Information</th> </tr> <tr> <th colspan="12"> <input type="checkbox"/> Same as Client Info PO # </th> </tr> </thead> <tbody> <tr> <td colspan="12"> <input type="checkbox"/> FAX <input type="checkbox"/> ADEX <input type="checkbox"/> Addl Deliverables </td> </tr> </tbody> </table>												Date Rec'd in Lab:												ALPHA Job #: L1739101												Data Deliverables												Billing Information												<input type="checkbox"/> Same as Client Info PO #												<input type="checkbox"/> FAX <input type="checkbox"/> ADEX <input type="checkbox"/> Addl Deliverables												Date Rec'd in Lab: ALPHA Job #: L1739101 Data Deliverables Billing Information <input type="checkbox"/> Same as Client Info PO #																																						
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Container Type A Preservative Date/Time Received By: Date/Time												Relinquished By: <i>Gina Hall</i> Date/Time <i>11/17/17 10:44</i> Received By: <i>11/17/17 19:30</i>																																																																																																														
PLEASE ANSWER QUESTIONS ABOVE!															<small>Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's payment terms.</small>																																																																																																											
IS YOUR PROJECT MA MCP or CT RCP? <small>Printed 0-0-01 Rev 0-0-01</small>																																																																																																																										

SUB Courier: Microvision

CHAIN OF CUSTODY

Page 5

MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

IS YOUR PROJECT MA MCP or CT RCP?

Signatures
Dawn HSC 11-27-10 5pm - will be back 11/28
11/28/10 5pm - will be back 11/29/10



CHAIN OF CUSTODY

PAGE 1 OF 2

Westborough, MA Mansfield, MA
 TEL: 508-898-8220 TEL: 508-822-9300
 FAX: 508-898-9193 FAX: 508-822-3288

Client Information

Client: Alpha Analytical Lab

Address: 320 Forbes Blvd.

Mansfield, Ma 02048

Phone: 508-822-9300

Project Information

Project Name:

Project Location: Ma

Project #:

Project Manager: Gina Hall

ALPHA Quote #:

Turn-Around Time
 Standard Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Fax:

Email:
subreports@alphalab.com, ghall@alphalab.com These samples have been Previously analyzed by Alpha**Other Project Specific Requirements/Comments/Detection Limits:**

L1743341

Please include Alpha job #L1739101 on this report.

Contact Gina Hall with questions.

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials
		Date	Time		
	BS1A-102617-1335	10/26/17	13:35	Soil	
	BS1B-102617-1215	10/26/17	12:15	Soil	
	S5A1-102617-1205	10/26/17	12:05	Soil	
	S5B1-102617-1125	10/26/17	11:25	Soil	
	S4A1-102617-1310	10/26/17	13:10	Soil	
	S4B1-102617-1135	10/26/17	11:35	Soil	
	S4C1-102617-1025	10/26/17	10:25	Soil	
	S3A1-102617-1150	10/26/17	11:50	Soil	
	S3B1-102617-1105	10/26/17	11:05	Soil	
	S3C1-102617-1010	10/26/17	10:10	Soil	

PLEASE ANSWER QUESTIONS ABOVE!

**IS YOUR PROJECT
MA MCP or CT RCP?**

Container Type	A	-	-	-	-	-	-	-	-	-	-
Preservative	A	-	-	-	-	-	-	-	-	-	-

Belinquisished By:

Date/Time

11/07/17

Received By:

Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.



11/16/2017

Alpha Analytical

MicroVision Labs Red Lead/Lead Paint Report, Job # 11267 Client Project#: L1739101

Scope of Work:

This report covers the methods and findings of the Red Lead/Lead Paint analysis that MicroVision Laboratories, Inc. conducted on four (4) soil samples submitted for testing from project number L1739101. The purpose of this analysis was to determine if any red lead particles, lead paint chips, leaded glass, or other lead-bearing particles may be present in the submitted soil samples by use of a combination of microscopy techniques including macroscopic inspection and SEM/EDS.

Methods:

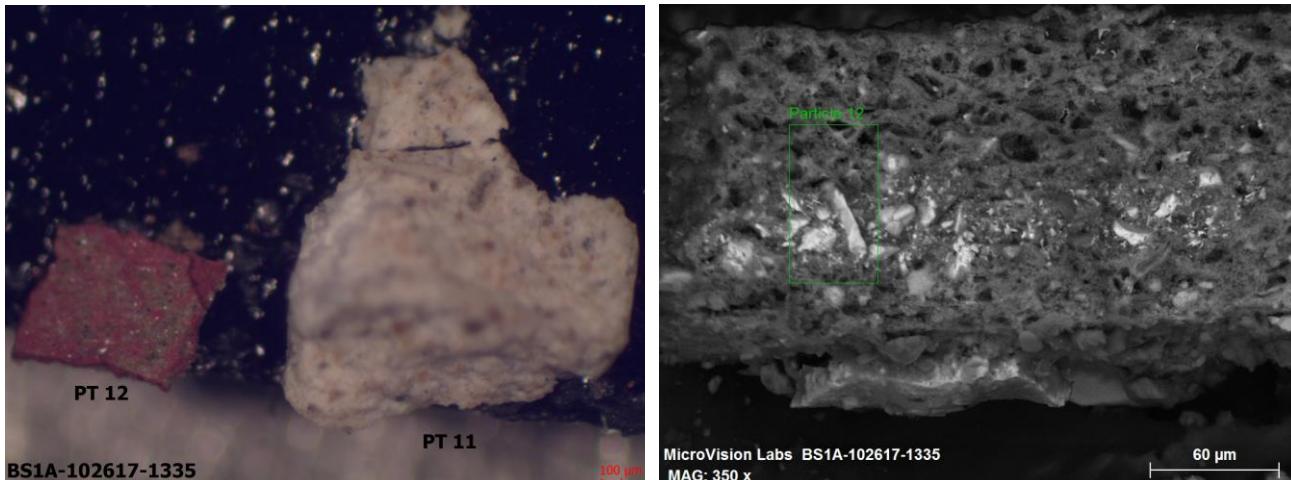
The samples were dried and examined by eye under the stereomicroscope for any suspect red or orange colored particles, any colored paint chips/flakes, glass particles, metallic particles or any other potentially lead-bearing particles. Suspect particles were separated from the soil samples and documented with optical images, then prepared for examination by Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the SEM examination, the suspect particles were mounted on an aluminum analysis stub with double sided adhesive tape and coated with evaporated graphite. Each of the suspect particles was examined in the SEM, and Backscatter Electron imaging (BSE) which correlates atomic density with image brightness was used to more readily detect the presence of heavy metals (including lead). EDS analysis was used to determine the elemental composition of the suspect particles. Representative digital images and EDS spectra were obtained for each sample and are presented on the following pages.

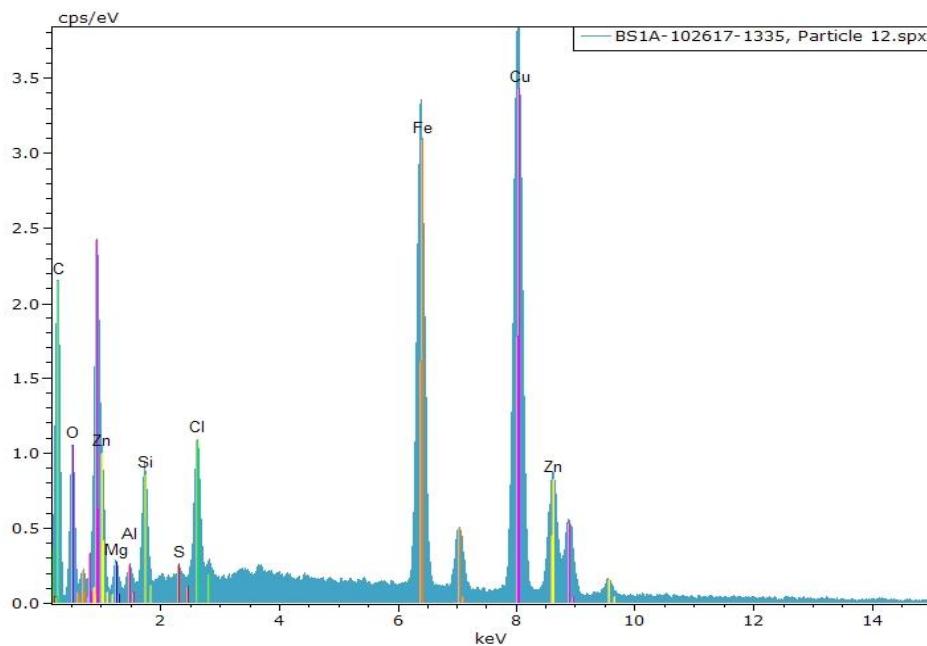
Sample: BS1A-102617-1335

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show a red chip detected in this soil sample, which did not contain lead. Although bright grains were visible with BSE in this particle, no lead was detected; instead these bright grains were rich in copper and zinc (see EDS spectrum below).



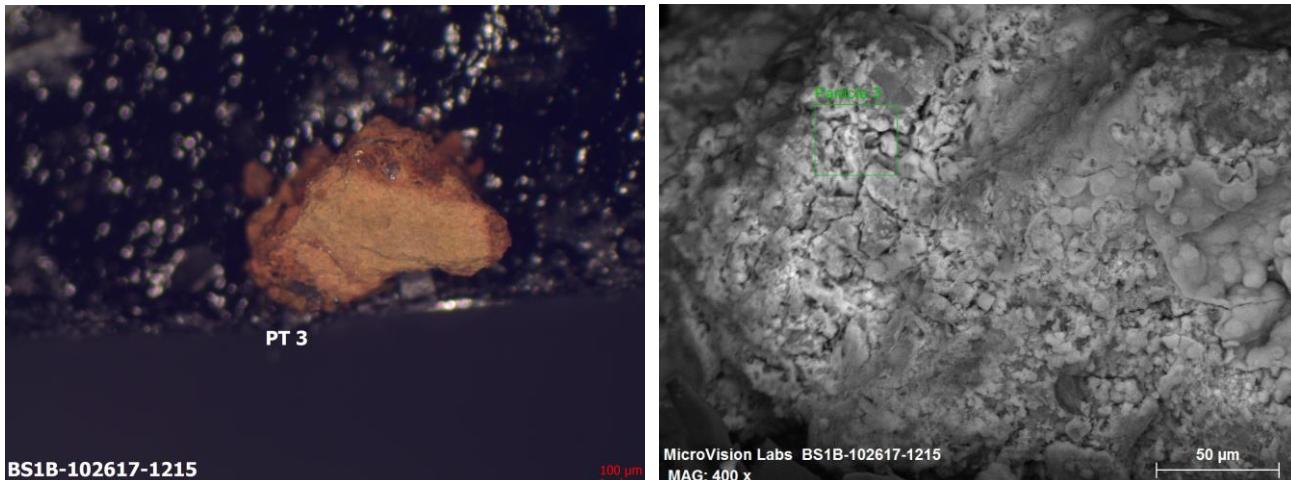
**Red chip (PT 12)- Optical image (above left), SEM/BSE Image (above right),
EDS Spectrum (below)**



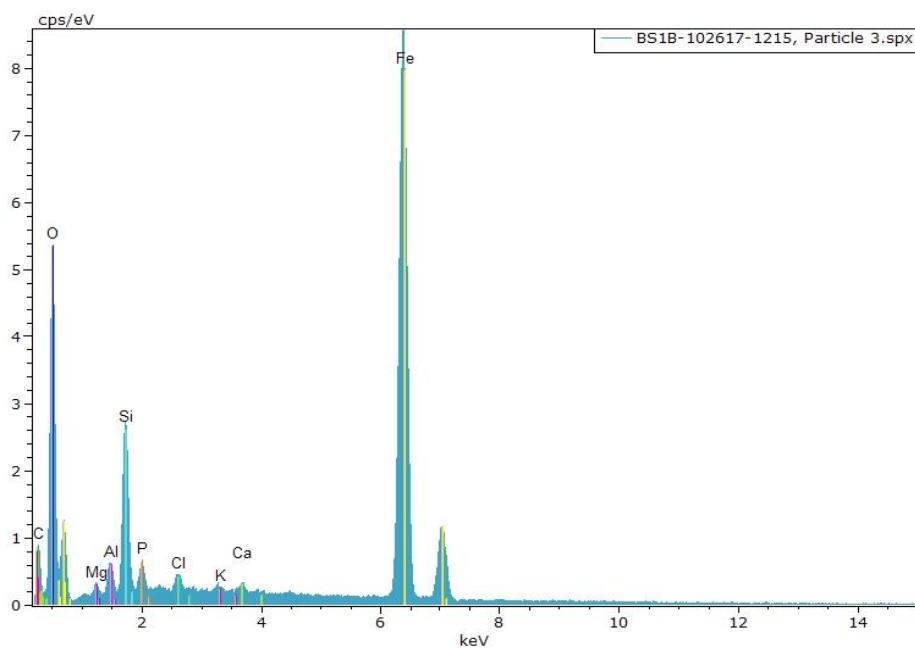
Sample: BS1B-102617-1215

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show an orange-red colored particle detected in this soil sample, which did not contain lead. Instead, this particle was comprised primarily of iron and oxygen, which is consistent with rust (see EDS spectrum below).



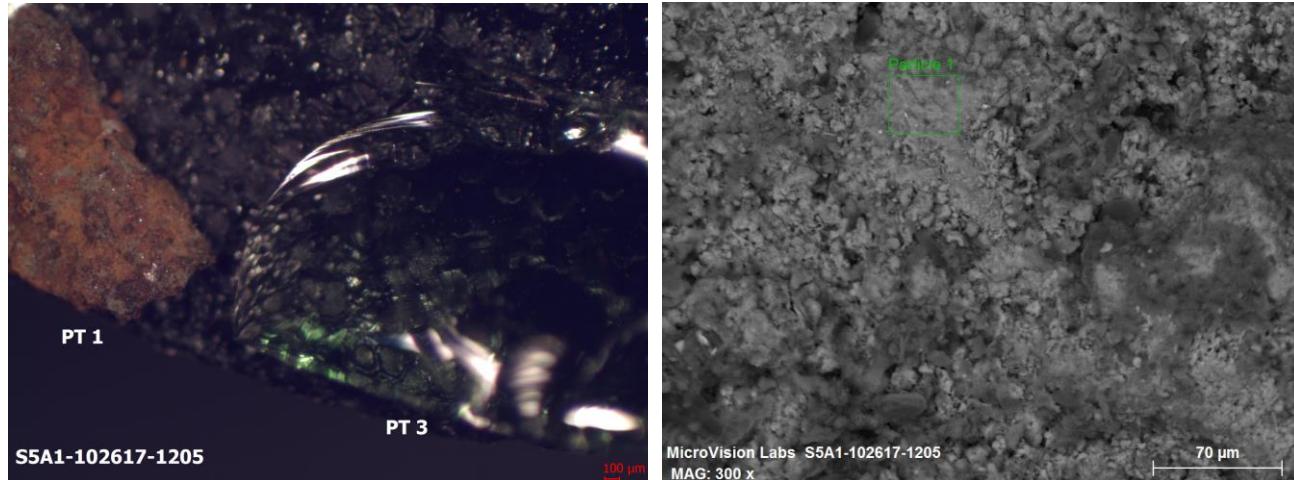
Orange-red rust particle- Optical image (above left), SEM/BSE Image (above right), EDS Spectrum (below)



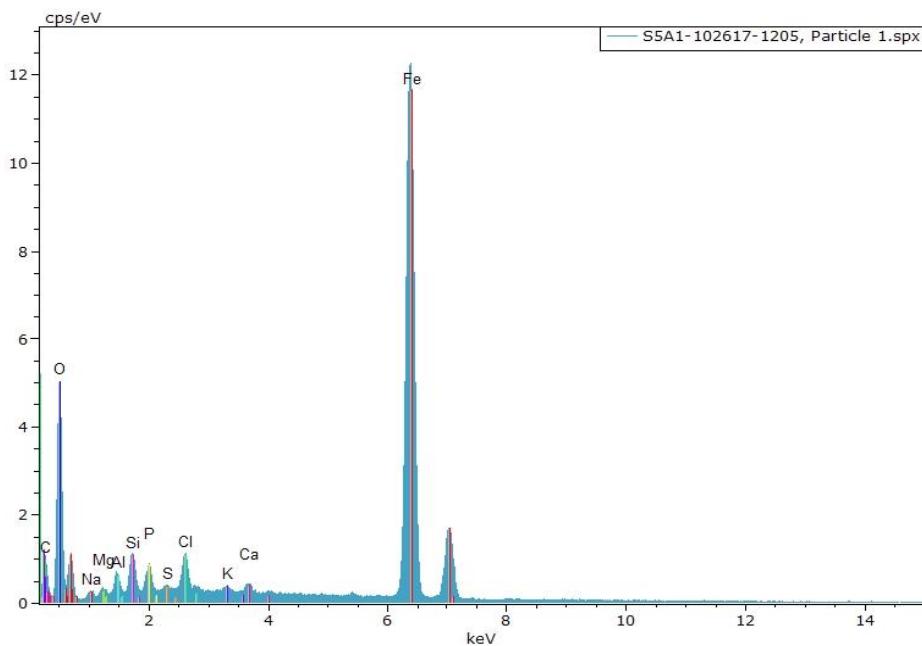
Sample: S5A1-102617-1205

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show an orange-red colored particle detected in this soil sample, which did not contain lead. Instead, this particle was comprised primarily of iron and oxygen, which is consistent with rust (see EDS spectrum below).



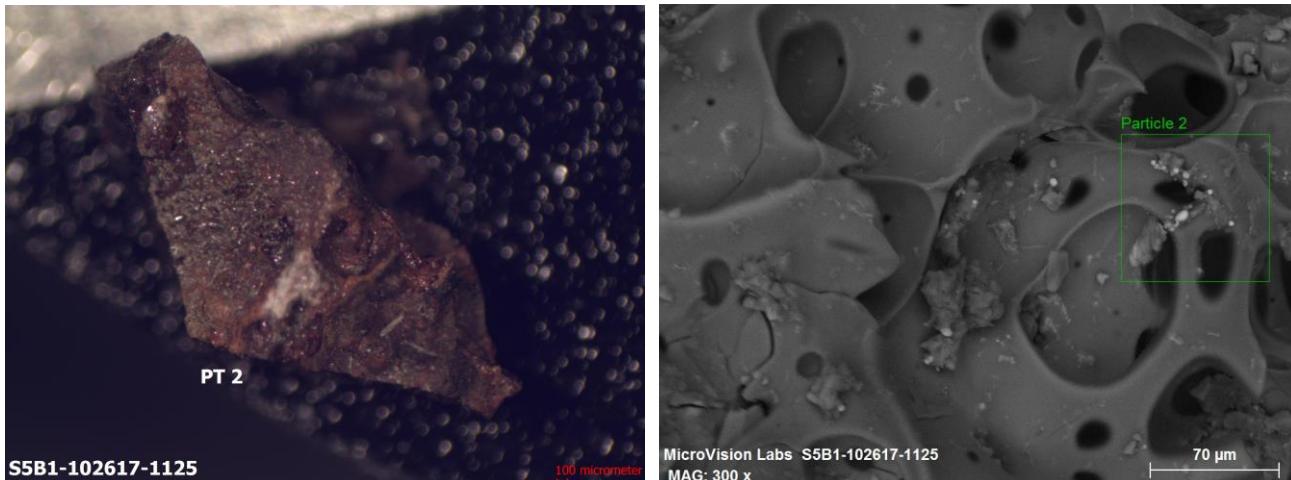
Orange-red rust particle (PT 1)- Optical image (above left), SEM/BSE Image (above right), EDS Spectrum (below)



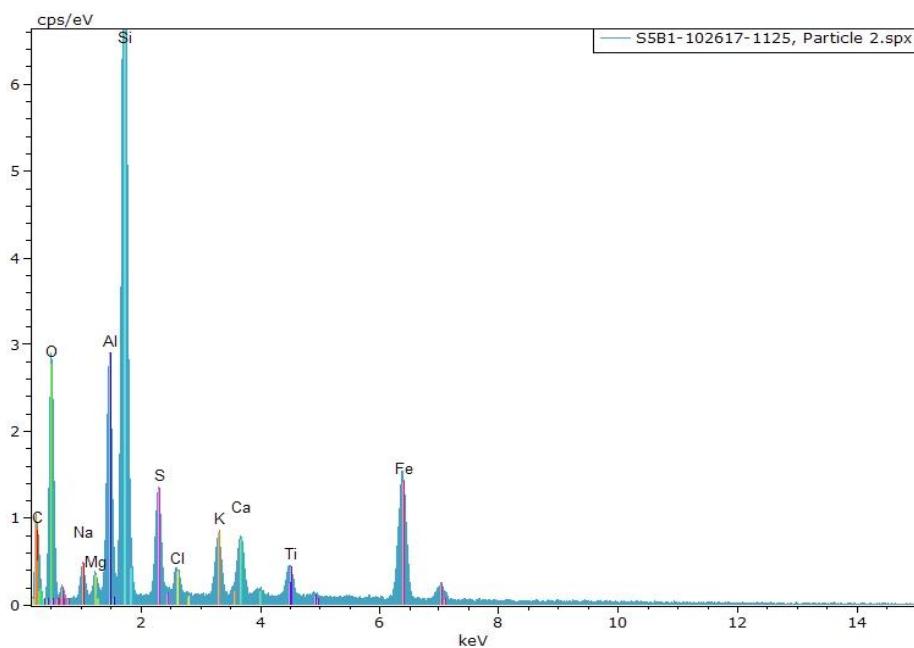
Sample: S5B1-102617-1125

None of the red or orange colored suspect particles detected in this soil sample contained lead. Furthermore, no lead paint, leaded glass, or any other lead-bearing particles were detected in the sample.

The optical and BSE images below show a maroon colored particle detected in this soil sample, which did not contain lead (EDS spectrum below). Numerous gas voids were visible in this particle, which was comprised primarily of silicon, aluminum and oxygen. This particle was consistent with coal ash.



Maroon coal ash particle- Optical image (above left), SEM/BSE Image (above right), EDS Spectrum (below)



Results Summary Table:

Sample Name	Material Detected	Lead Concentration
BS1A-102617-1335	Red chip	None detected
BS1B-102617-1215	Rust (iron oxide)	None detected
S5A1-102617-1205	Rust (iron oxide)	None detected
S5B1-102617-1125	Coal Ash	None detected

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,



Audra Chaput
Analytical Microscopist

SUB Courier: Microvision

11267

Page 7

ALPHA ANALYTICAL		CHAIN OF CUSTODY				PAGE 1 of 2																																																																							
Project Information Westborough, MA Mansfield, MA TEL: 508-898-9220 TEL: 508-822-9200 FAX: 508-898-9193 FAX: 508-822-3288		Date Rec'd in Lab: _____ ALPHA Job #: L1739101 Report Information Data Deliverables Billing Information <input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> Same as Client Info PO #: _____ <input type="checkbox"/> ADEX <input type="checkbox"/> Add'l Deliverables																																																																											
Client Information Client: Alpha Analytical Lab Project Location: Ma		Regulatory Requirements/Report Limits Project #: _____ Project Manager: Gina Hall ALPHA Quote #: _____ <input type="checkbox"/> Yes <input type="checkbox"/> No Are CT RCP Reasonable Confidence Protocols Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Are CT RCP Reasonable Confidence Protocols Required? Turn-Around Time <input type="checkbox"/> Standard <input type="checkbox"/> Rush (ONLY IF PRE-APPROVED)																																																																											
Email: subreports@alphalab.com.ghall@alphalab.com		Due Date: _____ Time: _____ <input type="checkbox"/> These samples have been Previously analyzed by Alpha																																																																											
Other Project Specific Requirements/Comments/Detection Limits: Please include Alpha job #L1739101 on this report. Contact Gina Hall with questions.																																																																													
PLEASE ANSWER QUESTIONS ABOVE! IS YOUR PROJECT MA MCP or CT RCP? <small>(Form 01-010) (Rev. 03-14-07)</small>		<table border="1"> <thead> <tr> <th>Container Type</th> <th>A</th> <th>-</th> </tr> <tr> <th>Preservative</th> <td>A</td> <td>-</td> </tr> </thead> <tbody> <tr> <td>Bellinquisished By:</td> <td colspan="11"><i>Gina Hall</i></td> </tr> <tr> <td>Date/Time</td> <td colspan="11">11/17/17</td> </tr> <tr> <td>Received By:</td> <td colspan="11"><i>JK</i></td> </tr> <tr> <td>Date/Time</td> <td colspan="11">11/17/17 1930</td> </tr> </tbody> </table> <p>Please print clearly, legibly and completely. Samples can not be bagged in and turned around time clock will not resolve if samples are submitted after payment terms.</p>				Container Type	A	-	-	-	-	-	-	-	-	-	-	Preservative	A	-	-	-	-	-	-	-	-	-	-	Bellinquisished By:	<i>Gina Hall</i>											Date/Time	11/17/17											Received By:	<i>JK</i>											Date/Time	11/17/17 1930										
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Date/Time	11/17/17 1930																																																																												

SUB Courier: Microvision

CHAIN OF CUSTODY

PAGE 2 of 2

Date Rec'd in Lab: ALPHA Job #: L1739101

Billing Information


**CHAIN OF
CUSTODY**

Service Centers

Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430
 Albany, NY 12205
 Tonawanda, NY 14210 Holmes, PA 19043

Page

1 of 3

Date Rec'd
in Lab

10/27/17

ALPHA Job #

L73901

Westborough, MA 01561 Mansfield, MA 02048
 6 Walkup Dr.
 TEL: 508-898-9220 TEL: 508-822-
 FAX: 508-898-9193 9300

H&A Information

H&A Client: Stop & Shop

H&A Address: 465 Medford Street

Boston, MA 02129

H&A Phone: 617-886-7400

H&A Fax:

H&A Email: Kalepidis, Esteinberg

These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

See project-specific QAPP

Please specify Metals or TAL.

Project Information

Project Name: Beverly USM

Project Location: Beverly MA

Project #: 37713-002

(Use Project name as Project #)

Project Manager: J. Sweet

ALPHAQuote #:

Turn-Around Time

Standard

Due Date:

Rush (only if pre approved)

of Days: 5 Day

Deliverables

- Email Fax
 EQuIS (1 File) EQuIS (4 File)
 Other:

Billing Information

 Same as Client Info

PO #

Regulatory Requirements (Program/Criteria)

MA RCS-1

EPA See Project QAPP

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:

- NJ NY
 Other

Note: Select State from menu & identify criteria.

ANALYSIS

Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Metals		P.A.V/S.E.M	S.E.N.T./E.P.S	L.O.C	L.O.D	L.O.L	L.O.H	L.O.T	
					Copper-Nickel-Zinc	Lead								
BS1A-102617-1335	10/26/17	1335	SED	SC/CRS	X	X	Sent	by	10/26/17	10/26/17	10/26/17	10/26/17	10/26/17	
BS1B-102617-1215	10/26/17	1215	SED	SC	X	X								
S5A1-102617-1205	10/26/17	1205	SED	SC	X	X								
S5B1-102617-1125		1125	SED	SC	X	X								
S4A1-102617-1310		1310	SED	SC	X	X								
S4B1-102617-1135		1135	SED	SC	X	X								
S4C1-102617-1025		1025	SED	SC	X	X								
S3A1-102617-1150		1150	SED	SC	X	X								
S3B1-102617-1105	V	1105	SED	SC	X	X								
S3C1-102617-1010	10/26/17	1010	SED	SC/CRS	X	X								

Preservative Code:	Container Code	Westboro: Certification No: MA935		Container Type		A	A	A	A	A	A
		A = None	P = Plastic	A	A						
B = HCl	A = Amber Glass										
C = HNO ₃	V = Vial										
D = H ₂ SO ₄	G = Glass										
E = NaOH	B = Bacteria Cup										
F = MeOH	C = Cube										
G = NaHSO ₄	O = Other										
H = Na ₂ S ₂ O ₃	E = Encore										
	D = BOD Bottle										

Relinquished By:		Date/Time	Received By:	Date/Time
Steve Clough H&A		10/26/17 14:15	J. Sweet	10/26/17 14:16
HAL	10/26/17 16:07	Jameson Matt	10/26/17 16:09	

Relinquished By:	Date/Time	Received By:	Date/Time
Steve Clough H&A	10/26/17 14:15	J. Sweet	10/26/17 14:16
HAL	10/26/17 16:07	Jameson Matt	10/26/17 16:09

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. Alpha Analytical's services under this Chain of Custody shall be performed in accordance with terms and conditions within Blanket Service Agreement# 2015-18-Alpha Analytical by and between Haley & Aldrich, Inc., its subsidiaries and affiliates and Alpha Analytical.


**CHAIN OF
CUSTODY**

Service Centers

Brewer, ME 04412 Portsmouth, NH 03801 Mahwah, NJ 07430
 Albany, NY 12205
 Tonawanda, NY 14210 Holmes, PA 19043

 Page
 2 of 3

 Date Rec'd
 in Lab

10/27/17

ALPHA Job #

L1739101
L1739004

Westborough, MA 01581 Mansfield, MA 02048
 8 Walkup Dr. 320 Forbes Blvd
 TEL: 508-886-8220 TEL: 508-822-9300
 FAX: 508-896-9193 FAX: 508-822-5286

H&A Information

H&A Client: Stop & Shop

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Boston, MA 02129

H&A Phone: 617-886-7400

H&A Fax:

H&A Email: Kaledpis, Esteinberg

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(Use Project name as Project #)

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Standard

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of Days: 5 Day

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 Other:

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 Same as Client Info

PO #

Regulatory Requirements (Program/Criteria)

MA RCS-1

EPA See Project QAPP

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:

- NJ NY
 Other:

Note: Select State from menu & identify criteria.

ANALYSIS

	Copper-Nickel-Zinc or G-AVISSEM Sub	TOC	Lead SERVED by HOLD LEAD SERVED by HOLD
1	X	X	X
2	X	X	X
3	X	X	X
4	X	X	X
5	X	X	X
6	X	X	X
7	X	X	X
8	X	X	X
9	X	X	X
10	X	X	X
11	X	X	X
12	X	X	X
13	X	X	X
14	X	X	X
15	X	X	X
16	X	X	X
17	X	X	X
18	X	X	X
19	X	X	X
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334	X	X	X
335	X	X	X
336	X	X	X
337	X	X	X
338	X	X	X
339	X	X	X
340	X	X	X



CHAIN OF CUSTODY

PAGE 1 OF 2

Westborough, MA Mansfield, MA
 TEL: 508-898-8220 TEL: 508-822-8300
 FAX: 508-898-9193 FAX: 508-822-3288

Client Information

Client: Alpha Analytical Lab

Address: 320 Forbes Blvd.

Mansfield, Ma 02048

Phone: 508-822-9300

Project Information

Project Name:

Project Location: Ma

Project #:

Project Manager: Gina Hall

ALPHA Quote #:

Turn-Around Time

Fax:

 Standard Rush (ONLY IF PRE-APPROVED)

 Email:
 subreports@alphalab.com ghall@alphalab.com

Due Date: Time:

 These samples have been Previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

Please include Alpha job #L1739101 on this report.

Contact Gina Hall with questions.

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials
		Date	Time		
	BS1A-102617-1335	10/26/17	13:35	Soil	
	BS1B-102617-1215	10/26/17	12:15	Soil	
	S5A1-102617-1205	10/26/17	12:05	Soil	
	S5B1-102617-1125	10/26/17	11:25	Soil	
	S4A1-102617-1310	10/26/17	13:10	Soil	
	S4B1-102617-1135	10/26/17	11:35	Soil	
	S4C1-102617-1025	10/26/17	10:25	Soil	
	S3A1-102617-1150	10/26/17	11:50	Soil	
	S3B1-102617-1105	10/26/17	11:05	Soil	
	S3C1-102617-1010	10/26/17	10:10	Soil	

PLEASE ANSWER QUESTIONS ABOVE!

**IS YOUR PROJECT
MA MCP or CT RCP?**

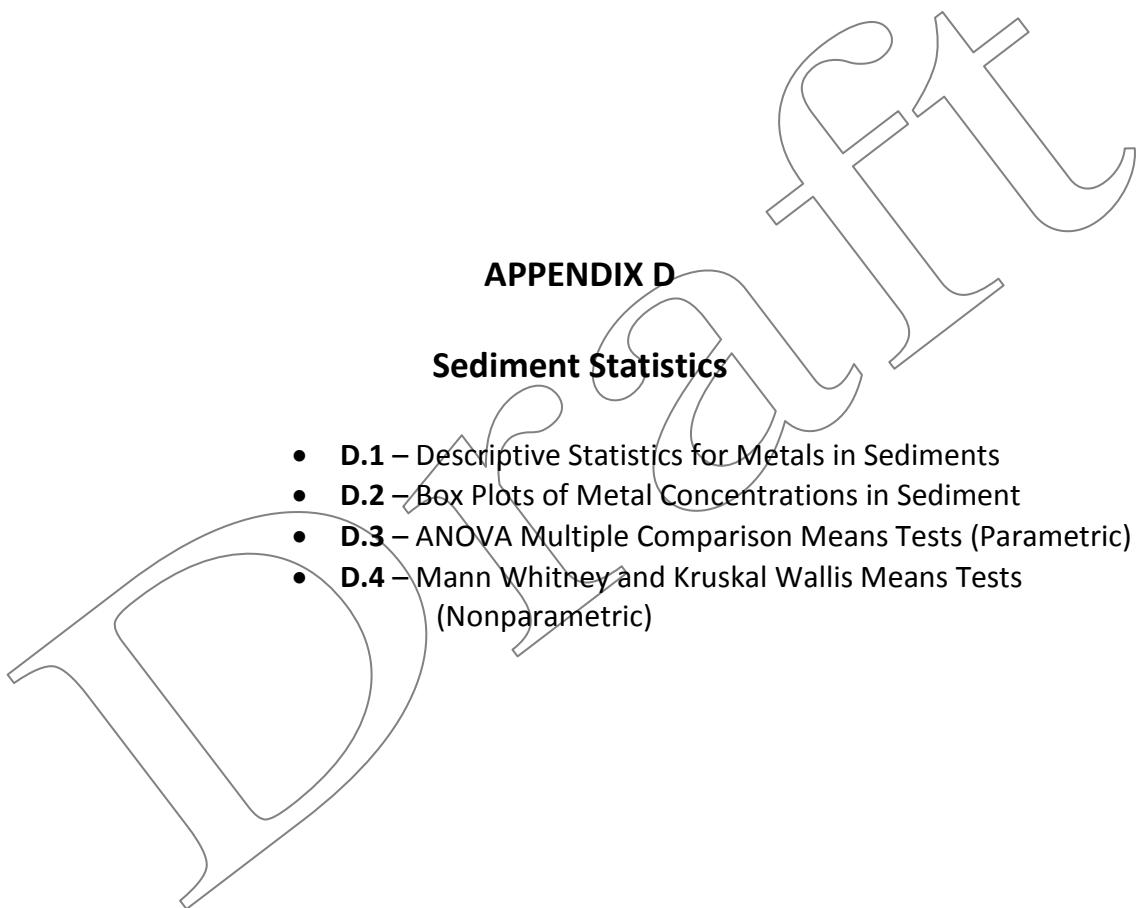
Container Type	A	-	-	-	-	-	-	-	-	-	-
	B	-	-	-	-	-	-	-	-	-	-
Preservative	A	-	-	-	-	-	-	-	-	-	-
Belinquisished By:	Date/Time			Received By:				Date/Time			
<i>Gina Hall</i>	11/07/17										

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.



CHAIN OF CUSTODY

PAGE 2 OF 2



APPENDIX D

Sediment Statistics

- **D.1 – Descriptive Statistics for Metals in Sediments**
- **D.2 – Box Plots of Metal Concentrations in Sediment**
- **D.3 – ANOVA Multiple Comparison Means Tests (Parametric)**
- **D.4 – Mann Whitney and Kruskal Wallis Means Tests
(Nonparametric)**

APPENDIX D-1

Descriptive Statistics for Metals in Sediment: Reference Area, Site and Yacht Club

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Arsenic when Reach=Reference

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	23.8	4.227123	1.494514	18.9	32	13.1

Counts Section of Arsenic when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	190.4	4656.6	125.08

Means Section of Arsenic when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	23.8	23.55	23.48752	23.19054	190.4	
Std Error	1.494514				11.95611	
95% LCL	20.26604	18.9	20.33712	20.33763	162.1283	
95% UCL	27.33396	26.7	27.12596	26.97444	218.6717	
T-Value	15.92491					
Prob Level	9.341935E-07					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Arsenic when Reach=Reference**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	17.86857	4.227123	4.380301	1.494514	6.2	13.1
Std Error	8.744404	1.462751		0.5171604		
95% LCL	7.811268	2.794865		0.9881338		
95% UCL	74.01756	8.603346		3.041742		

Skewness and Kurtosis Section of Arsenic when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.6976582	2.91589	0.8701326	1.22337	0.1776102	0.1242038
Std Error	0.376976	1.416401			0.03924877	

Quartile Section of Arsenic when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	18.9	19.875	23.55	26.075	32
95% LCL			18.9		
95% UCL			26.7		

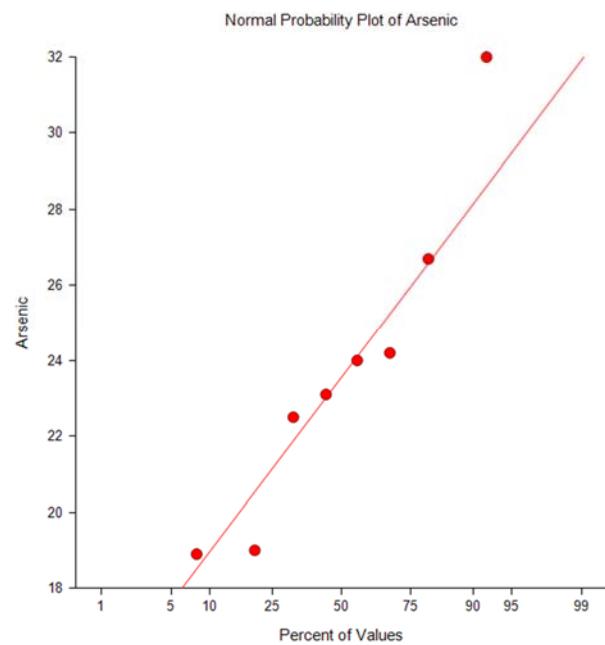
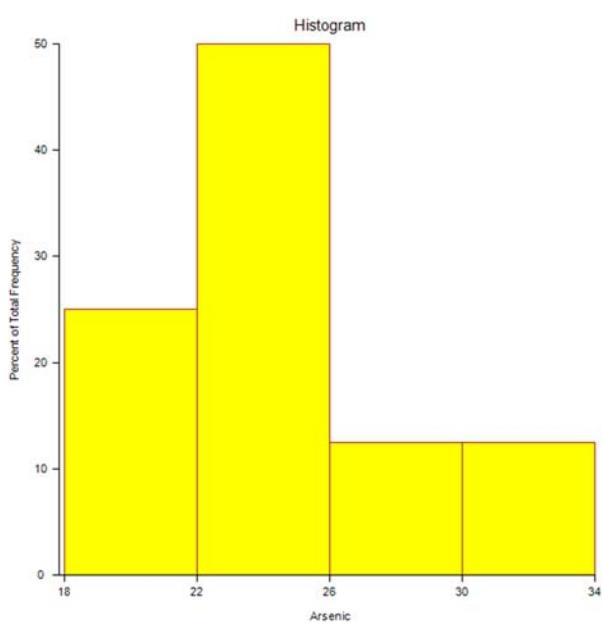
Normality Test Section of Arsenic when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.917106	0.4068244			Can't reject normality
Anderson-Darling	0.3810324	0.4012808			Can't reject normality
Martinez-Iglewicz	1.151143		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.2123055		0.265	0.288	Can't reject normality
D'Agostino Skewness	1.167297	0.2430906	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.9282	0.353303	1.645	1.96	Can't reject normality
D'Agostino Omnibus	2.2241	0.328877	4.605	5.991	Can't reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Arsenic when Reach=Reference

Descriptive Statistics Report

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Percentile Section of Arsenic when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	32			
95	32			
90	32			
85	30.145			
80	27.76			
75	26.075			
70	24.95			
65	24.17	19	32	96.45647
60	24.08	19	32	97.46841
55	23.955	19	32	97.35036
50	23.55	18.9	26.7	96.09375
45	23.145	18.9	26.7	97.35036
40	22.86	18.9	26.7	97.46841
35	22.59	18.9	26.7	96.45647
30	21.45			
25	19.875			
20	18.98			
15	18.935			
10	18.9			
5	18.9			
1	18.9			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Arsenic when Reach=Reference

Depth	Stem	Leaves
2	1.	89
2	2*	
4	T	23
4	F	44
2	S	6
1	.	
1	3*	
1	T	2

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Arsenic when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	29.1125	5.852821	1.689564	17.95	39.5	21.55

Counts Section of Arsenic when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	12	349.35	10547.26	376.8106

Means Section of Arsenic when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	29.1125	27.85	28.55432	27.97027	349.35	
Std Error	1.689564				20.27477	
95% LCL	25.3938	25.5	25.00599	24.51429	304.7256	
95% UCL	32.8312	35.8	32.60616	32.5606	393.9745	
T-Value	17.23078					
Prob Level	2.627029E-09					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Arsenic when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	34.25551	5.852821	5.987177	1.689564	8.65	21.55
Std Error	13.02074	1.573097		0.454114		
95% LCL	17.19023	4.14611		1.196879		
95% UCL	98.75143	9.937376		2.868673		

Skewness and Kurtosis Section of Arsenic when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.09107808	2.733771	0.1046408	0.3103252	0.2010415	0.1497606
Std Error	0.4096246	0.8020911			0.03905941	

Quartile Section of Arsenic when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	19.825	25.925	27.85	34.575	38.48
95% LCL		17.95	25.5	27.5	
95% UCL		28.2	35.8	39.5	

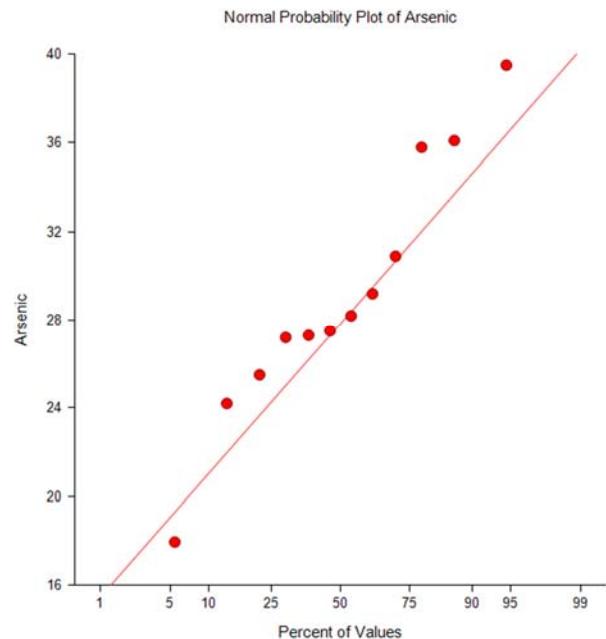
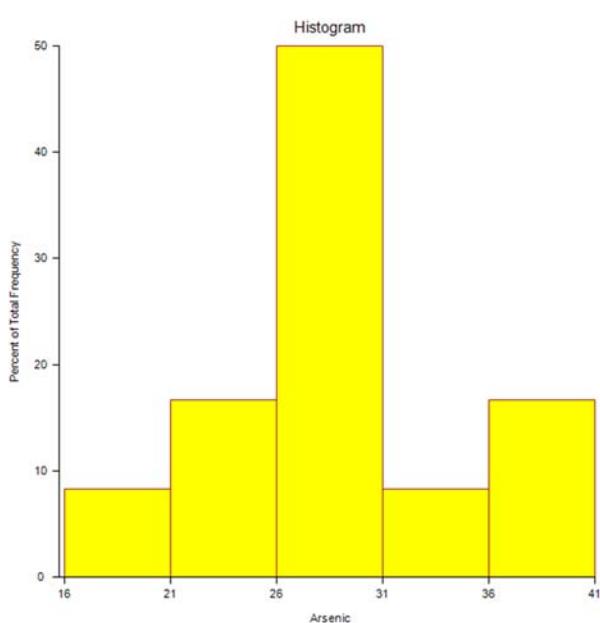
Normality Test Section of Arsenic when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9535364	0.6891125			Can't reject normality
Anderson-Darling	0.3951548	0.3720784			Can't reject normality
Martinez-Iglewicz	1.053507		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.1607027		0.222	0.242	Can't reject normality
D'Agostino Skewness	0.1721001	0.8633588	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.4705	0.638004	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.2510	0.882064	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Arsenic when Reach=Site

Descriptive Statistics Report

Dataset

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Percentile Section of Arsenic when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	39.5			
95	39.5			
90	38.48			
85	36.27			
80	35.92			
75	34.575	27.5	39.5	95.40709
70	31.39	27.3	39.5	97.66693
65	29.965	27.2	36.1	95.19489
60	29	27.2	36.1	96.51417
55	28.35	27.2	36.1	95.6136
50	27.85	25.5	35.8	96.14258
45	27.47	24.2	30.9	95.6136
40	27.34	24.2	30.9	96.51417
35	27.255	17.95	29.2	96.88046
30	27.03	17.95	29.2	97.66693
25	25.925	17.95	28.2	95.40709
20	24.98			
15	23.8875			
10	19.825			
5	17.95			
1	17.95			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Arsenic when Reach=Site

Depth	Stem	Leaves
1	1.	7
2	2*	4
(6)	.	577789
4	3*	0
3	.	569

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

Dataset

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Summary Section of Arsenic when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	26.8	11.31371	8	18.8	34.8	16

Counts Section of Arsenic when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	53.6	1564.48	128

Means Section of Arsenic when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	26.8	26.8	25.57812	24.41194	53.6	
Std Error	8				16	
95% LCL	-74.84964		0.5115794	5.093358	-149.6993	
95% UCL	128.4496		1278.863	-8.740724	256.8993	
T-Value	3.35					
Prob Level	0.1846751					
Count	2		2	2		0

The geometric mean confidence interval assumes that the ln(y) are normally distributed.

The harmonic mean confidence interval assumes that the 1/y are normally distributed.

Variation Section of Arsenic when Reach=Yacht Club

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	128	11.31371	14.17963	8	16	16
Std Error	0	0		0		
95% LCL	25.47828	5.047602		3.569193		
95% UCL	130337.1	361.0222		255.2813		

Skewness and Kurtosis Section of Arsenic when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.4221533	0.2985075
Std Error					0.08910671	

Quartile Section of Arsenic when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	18.8	18.8	26.8	34.8	34.8
95% LCL					
95% UCL					

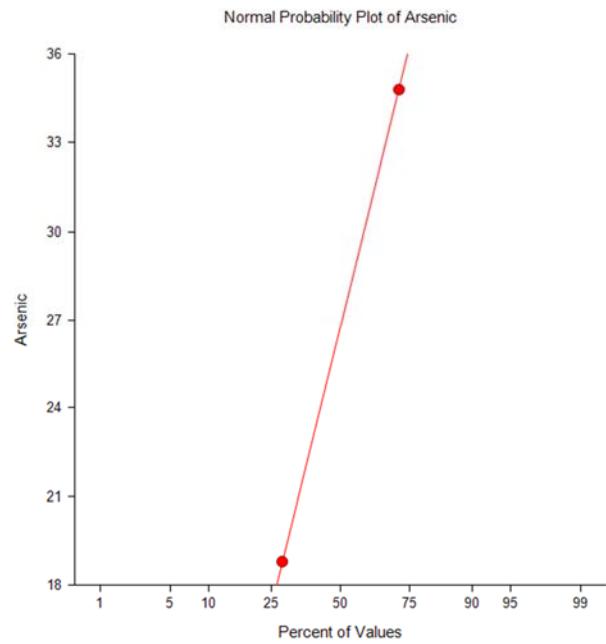
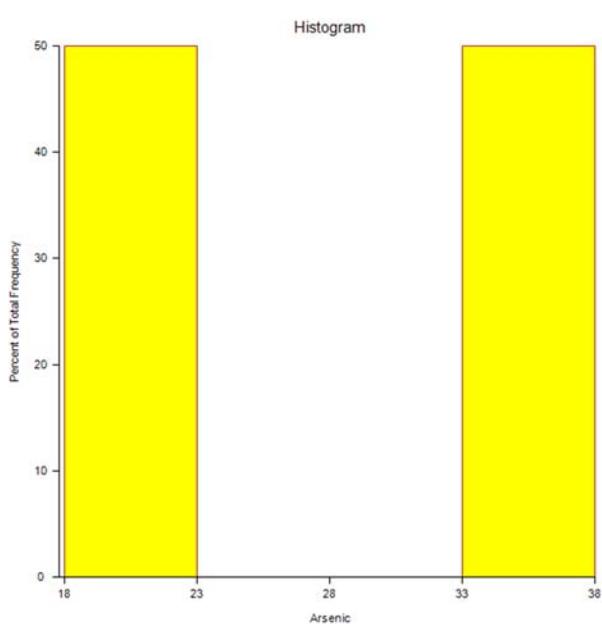
Normality Test Section of Arsenic when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Arsenic when Reach=Yacht Club

Descriptive Statistics Report

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Percentile Section of Arsenic when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	34.8			
95	34.8			
90	34.8			
85	34.8			
80	34.8			
75	34.8			
70	34.8			
65	34			
60	31.6			
55	29.2			
50	26.8			
45	24.4			
40	22			
35	19.6			
30	18.8			
25	18.8			
20	18.8			
15	18.8			
10	18.8			
5	18.8			
1	18.8			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Arsenic when Reach=Yacht Club**Summary Section of Barium when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	78.8375	19.09831	6.752273	47.2	105	57.8

Counts Section of Barium when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	630.7	52276.03	2553.219

Means Section of Barium when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	78.8375	76.55	76.68377	74.39941	630.7	
Std Error	6.752273				54.01818	
95% LCL	62.87091	47.2	61.83045	60.43861	502.9673	
95% UCL	94.80409	102	95.10525	96.74719	758.4327	
T-Value	11.6757					
Prob Level	7.640184E-06					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Descriptive Statistics Report

Dataset

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Variation Section of Barium when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	364.7455	19.09831	19.79037	6.752273	31.1	57.8
Std Error	141.4092	5.235614		1.851069		
95% LCL	159.449	12.62731		4.464428		
95% UCL	1510.897	38.87026		13.74271		

Skewness and Kurtosis Section of Barium when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.07702312	2.202445	-0.0960647	-0.2748652	0.2422491	0.1889288
Std Error	0.4122407	0.6279659			0.05205636	

Quartile Section of Barium when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	47.2	67.225	76.55	98.325	105
95% LCL			47.2		
95% UCL			102		

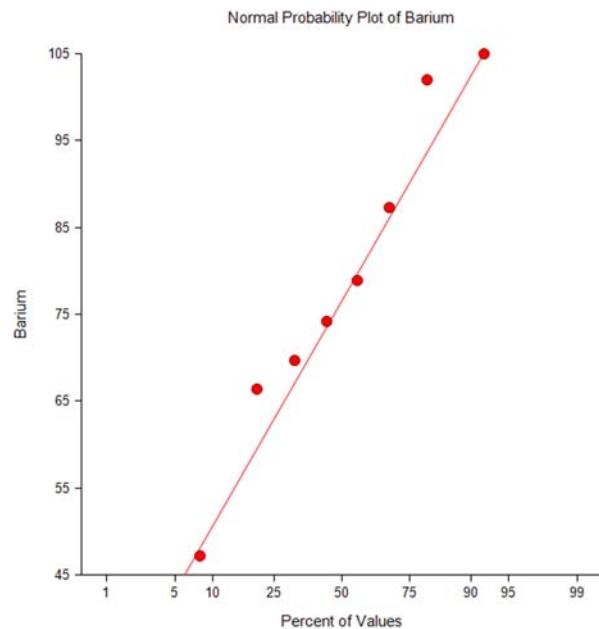
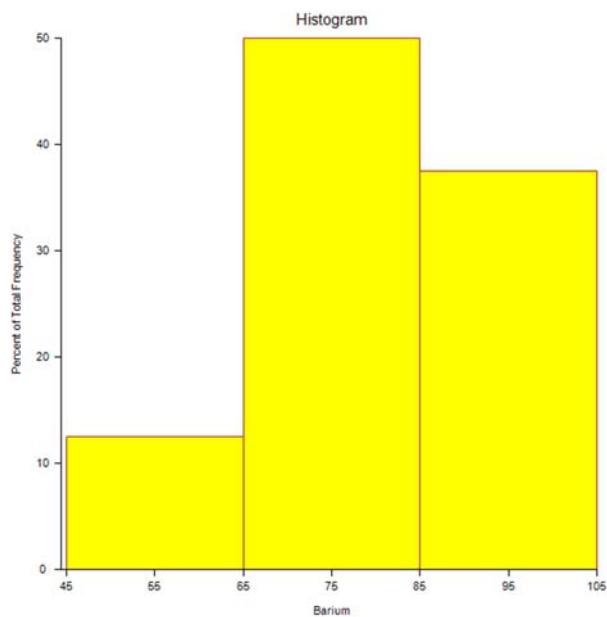
Normality Test Section of Barium when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9627873	0.8361952			Can't reject normality
Anderson-Darling	0.2239329	0.8245174			Can't reject normality
Martinez-Iglewicz	1.003802		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1236944		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.1298083	0.8967181	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-0.0283	0.977452	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.0176	0.991214	4.605	5.991	Can't reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Barium when Reach=Reference

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Barium when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	105			
95	105			
90	105			
85	103.95			
80	102.6			
75	98.325			
70	91.71			
65	86.04	66.4	105	96.45647
60	82.26	66.4	105	97.46841
55	78.665	66.4	105	97.35036
50	76.55	47.2	102	96.09375
45	74.435	47.2	102	97.35036
40	72.4	47.2	102	97.46841
35	70.375	47.2	102	96.45647
30	68.71			
25	67.225			
20	62.56			
15	53.92			
10	47.2			
5	47.2			
1	47.2			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Barium when Reach=Reference

Depth	Stem	Leaves
1	4	7
1	5	
3	6	69
(2)	7	48
3	8	7
2	9	
2	10	25

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Barium when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	76.425	26.56755	7.669392	35.9	108	72.1

Counts Section of Barium when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	11	917.1	77853.55	7764.183

Means Section of Barium when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	76.425	80.15	71.64136	66.57913	917.1	46.4
Std Error	7.669392				92.0327	
95% LCL	59.54478	46.4	55.89538	52.58696	714.5374	
95% UCL	93.30521	106	91.82304	90.71675	1119.663	
T-Value	9.964936					
Prob Level	7.657002E-07					
Count	12		12	12		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Barium when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	705.8348	26.56755	27.17743	7.669392	57.325	72.1
Std Error	154.118	4.101917		1.184121		
95% LCL	354.2046	18.82032		5.43296		
95% UCL	2034.773	45.10846		13.02169		

Skewness and Kurtosis Section of Barium when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.236882	1.572113	-0.2721567	-1.53542	0.3476291	0.2750052
Std Error	0.4591298	0.4007897			0.05787833	

Quartile Section of Barium when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	39.05	46.675	80.15	104	107.7
95% LCL		35.9	46.4	77.3	
95% UCL		83	106	108	

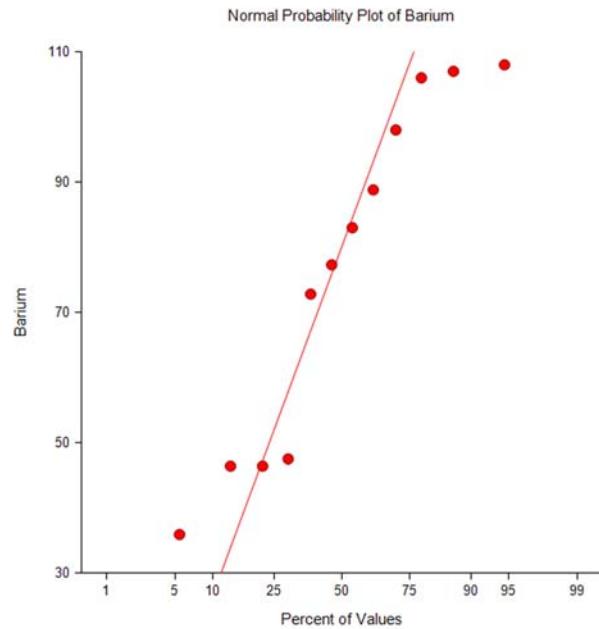
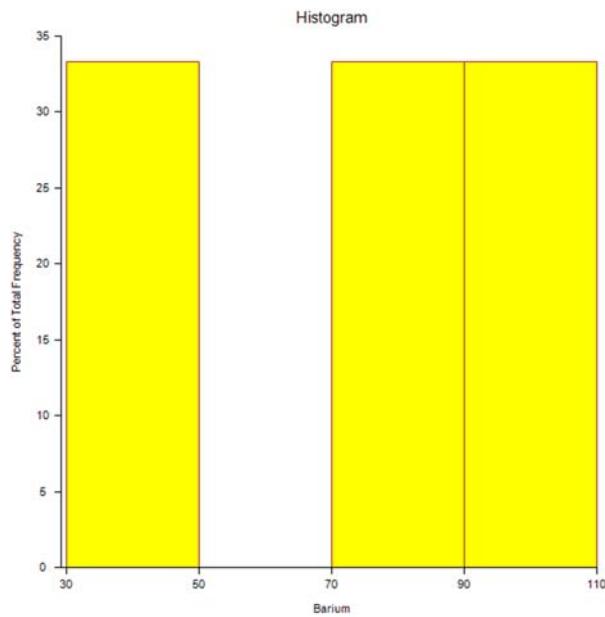
Normality Test Section of Barium when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.89321	0.1296284			Can't reject normality
Anderson-Darling	0.5324572	0.1734391			Can't reject normality
Martinez-Iglewicz	1.027006		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.1951978		0.222	0.242	Can't reject normality
D'Agostino Skewness	-0.446428	0.6552881	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.6966	0.089776	1.645	1.96	Can't reject normality
D'Agostino Omnibus	3.0777	0.214629	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Barium when Reach=Site

Descriptive Statistics Report

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Percentile Section of Barium when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	108			
95	108			
90	107.7			
85	107.05			
80	106.4			
75	104	77.3	108	95.40709
70	98.8	72.8	108	97.66693
65	92.94	47.5	107	95.19489
60	87.64	47.5	107	96.51417
55	83.87	47.5	107	95.6136
50	80.15	46.4	106	96.14258
45	76.625	46.4	98	95.6136
40	73.7	46.4	98	96.51417
35	61.415	35.9	88.8	96.88046
30	47.39	35.9	88.8	97.66693
25	46.675	35.9	83	95.40709
20	46.4			
15	45.875			
10	39.05			
5	35.9			
1	35.9			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Barium when Reach=Site

Depth	Stem	Leaves
1	3	5
4	4	667
4	5	
4	6	
6	7	27
6	8	38
4	9	8
3	10	678

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

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Summary Section of Barium when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	91.475	29.02673	20.525	70.95	112	41.05

Counts Section of Barium when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	182.95	17577.9	842.5513

Means Section of Barium when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	91.475	91.475	89.14259	86.86964	182.95	
Std Error	20.525				41.05	
95% LCL	-169.3199		4.903243	22.55771	-338.6397	
95% UCL	352.2699		1620.642	-46.93129	704.5397	
T-Value	4.45676					
Prob Level	0.1405164					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Barium when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	842.5513	29.02673	36.37962	20.525	41.05	41.05
Std Error	7.629395E-06	1.858561E-07		1.314201E-07		
95% LCL	167.7091	12.95025		9.157212		
95% UCL	857934.8	926.2477		654.956		

Skewness and Kurtosis Section of Barium when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.3173188	0.2243782
Std Error					0.0503456	

Quartile Section of Barium when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	70.95	70.95	91.475	112	112
95% LCL					
95% UCL					

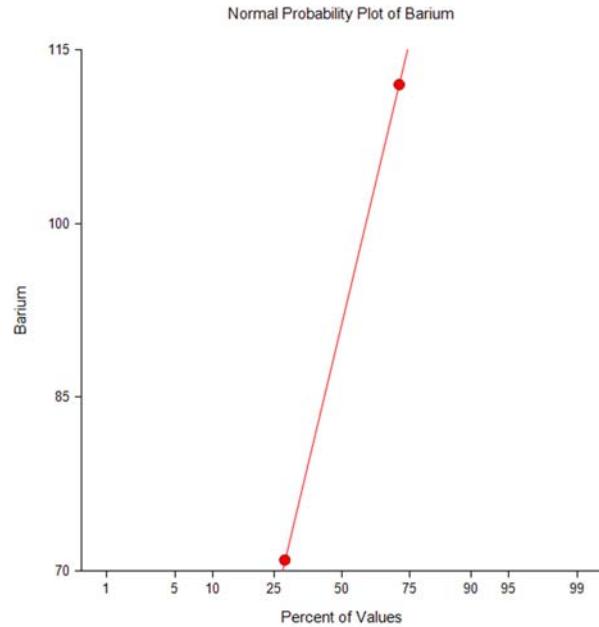
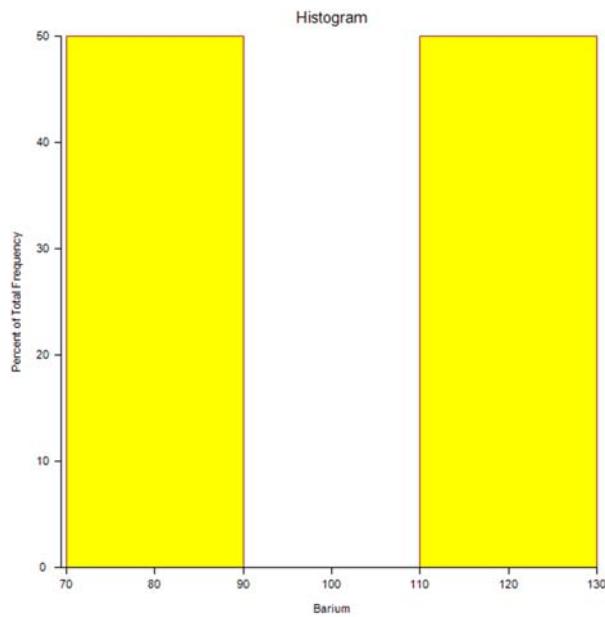
Normality Test Section of Barium when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of Barium when Reach=Yacht Club

Descriptive Statistics Report
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Percentile Section of Barium when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	112			
95	112			
90	112			
85	112			
80	112			
75	112			
70	112			
65	109.9475			
60	103.79			
55	97.6325			
50	91.475			
45	85.3175			
40	79.16			
35	73.0025			
30	70.95			
25	70.95			
20	70.95			
15	70.95			
10	70.95			
5	70.95			
1	70.95			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Barium when Reach=Yacht Club

Summary Section of Cadmium when Reach=Reference

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	1.83025	0.5445627	0.192532	0.821	2.578	1.757

Counts Section of Cadmium when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	14.642	28.87436	2.07584

Means Section of Cadmium when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.83025	1.884	1.742864	1.636132	14.642	
Std Error	0.192532				1.540256	
95% LCL	1.374984	0.821	1.292934	1.200829	10.99987	
95% UCL	2.285516	2.203	2.349367	2.566493	18.28413	
T-Value	9.506213					
Prob Level	2.98429E-05					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Descriptive Statistics Report

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Variation Section of Cadmium when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.2965485	0.5445627	0.5642958	0.192532	0.71775	1.757
Std Error	0.133985	0.1739776		0.06151037		
95% LCL	0.1296366	0.3600508		0.1272972		
95% UCL	1.228402	1.108333		0.391855		

Skewness and Kurtosis Section of Cadmium when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.5626157	2.633093	-0.701705	0.6294957	0.2975346	0.2190817
Std Error	0.4626094	1.113446			0.08430791	

Quartile Section of Cadmium when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.821	1.47625	1.884	2.194	2.578
95% LCL			0.821		
95% UCL			2.203		

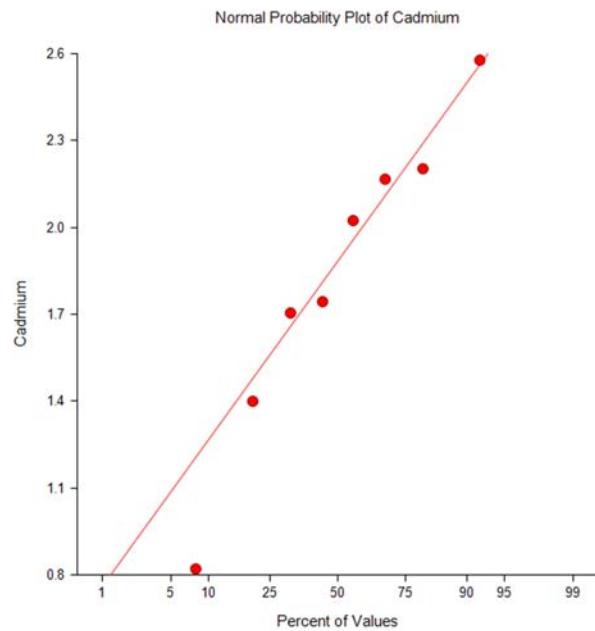
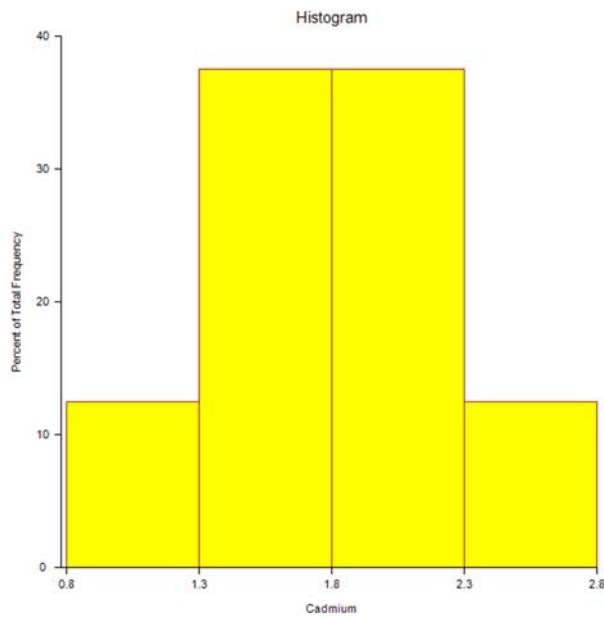
Normality Test Section of Cadmium when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9629014	0.8372419			Can't reject normality
Anderson-Darling	0.2492815	0.7470016			Can't reject normality
Martinez-Iglewicz	1.111229		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1218316		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.943738	0.3453035	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.5865	0.557512	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.2347	0.539379	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Cadmium when Reach=Reference

Descriptive Statistics Report

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Percentile Section of Cadmium when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	2.578			
95	2.578			
90	2.578			
85	2.44675			
80	2.278			
75	2.194			
70	2.1778			
65	2.14555	1.4	2.578	96.45647
60	2.0812	1.4	2.578	97.46841
55	2.01	1.4	2.578	97.35036
50	1.884	0.821	2.203	96.09375
45	1.758	0.821	2.203	97.35036
40	1.7284	0.821	2.203	97.46841
35	1.71085	0.821	2.203	96.45647
30	1.6135			
25	1.47625			
20	1.2842			
15	1.02365			
10	0.821			
5	0.821			
1	0.821			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Cadmium when Reach=Reference

Depth	Stem	Leaves
1	.	8
1	1*	
1	T	
2	F	4
4	S	77
4	.	
4	2*	01
2	T	2
1	F	5

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

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Summary Section of Cadmium when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
11	1.893459	0.9230052	0.2782965	0.4788	2.999	2.5202

Counts Section of Cadmium when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	11	1	11	20.82805	47.95645	8.519385

Means Section of Cadmium when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.893459	2.302	1.609884	1.286201	20.82805	
Std Error	0.2782965				3.061262	
95% LCL	1.273376	0.62655	1.03158	0.8442036	14.00713	
95% UCL	2.513542	2.614	2.512385	2.699645	27.64897	
T-Value	6.803747					
Prob Level	4.718828E-05					
Count	11		11	11		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Variation Section of Cadmium when Reach=Site

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.8519385	0.9230052	0.9463322	0.2782965	1.8553	2.5202
Std Error	0.2076894	0.1591092		0.04797323		
95% LCL	0.4159211	0.6449195		0.1944505		
95% UCL	2.623793	1.619813		0.4883919		

Skewness and Kurtosis Section of Cadmium when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.4675185	1.65374	-0.5448195	-1.410433	0.4874704	0.3264335
Std Error	0.5286688	0.6505805			0.1135403	

Quartile Section of Cadmium when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.50835	0.7587	2.302	2.614	2.9468
95% LCL		0.4788	0.62655	1.818	
95% UCL		2.458	2.614	2.999	

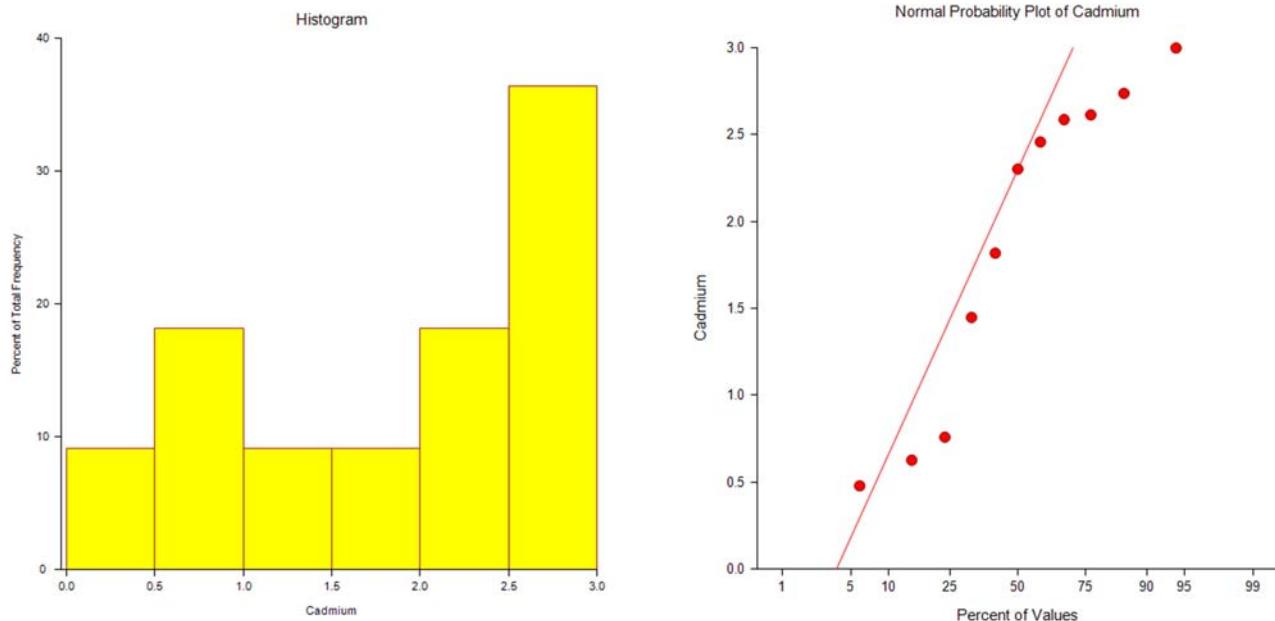
Normality Test Section of Cadmium when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.8802689	0.1048674			Can't reject normality
Anderson-Darling	0.6152477	0.1095134			Can't reject normality
Martinez-Iglewicz	1.011157		1.390037	1.823783	Can't reject normality
Kolmogorov-Smirnov	0.1632697		0.231	0.251	Can't reject normality
D'Agostino Skewness	-0.8518694	0.3942866	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.3717	0.170145	1.645	1.96	Can't reject normality
D'Agostino Omnibus	2.6073	0.271532	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Cadmium when Reach=Site

Descriptive Statistics Report
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Percentile Section of Cadmium when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	2.999			
95	2.999			
90	2.9468			
85	2.7902			
80	2.6884			
75	2.614	1.818	2.999	95.02036
70	2.5978	1.818	2.999	95.86076
65	2.5612	1.448	2.999	97.90069
60	2.4838	0.7587	2.738	96.38425
55	2.3956	0.7587	2.738	97.12662
50	2.302	0.62655	2.614	96.14258
45	2.0116	0.62655	2.614	97.12662
40	1.744	0.4788	2.587	96.70905
35	1.522	0.4788	2.587	97.90069
30	1.17228	0.4788	2.458	95.86076
25	0.7587	0.4788	2.458	95.02036
20	0.67941			
15	0.597			
10	0.50835			
5	0.4788			
1	0.4788			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Cadmium when Reach=Site

Depth	Stem	Leaves
1	0*	4
3	.	67
4	1*	4
5	.	8
(2)	2*	34
4	.	5679

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

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Summary Section of Cadmium when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	0.881175	0.6898887	0.487825	0.39335	1.369	0.97565

Counts Section of Cadmium when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	1.76235	2.028885	0.4759465

Means Section of Cadmium when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	0.881175	0.881175	0.7338229	0.6111115	1.76235	
Std Error	0.487825				0.97565	
95% LCL	-5.317229		0.0002658255	0.0760633	-10.63446	
95% UCL	7.079579		2025.75	-0.1012738	14.15916	
T-Value	1.806334					
Prob Level	0.3218804					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Cadmium when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.4759465	0.6898887	0.8646473	0.487825	0.97565	0.97565
Std Error	3.72529E-09	3.818265E-09		2.699921E-09		
95% LCL	0.09473671	0.3077933		0.2176427		
95% UCL	484.6364	22.01446		15.56657		

Skewness and Kurtosis Section of Cadmium when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.7829191	0.5536074
Std Error					0.3064812	

Quartile Section of Cadmium when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.39335	0.39335	0.881175	1.369	1.369
95% LCL					
95% UCL					

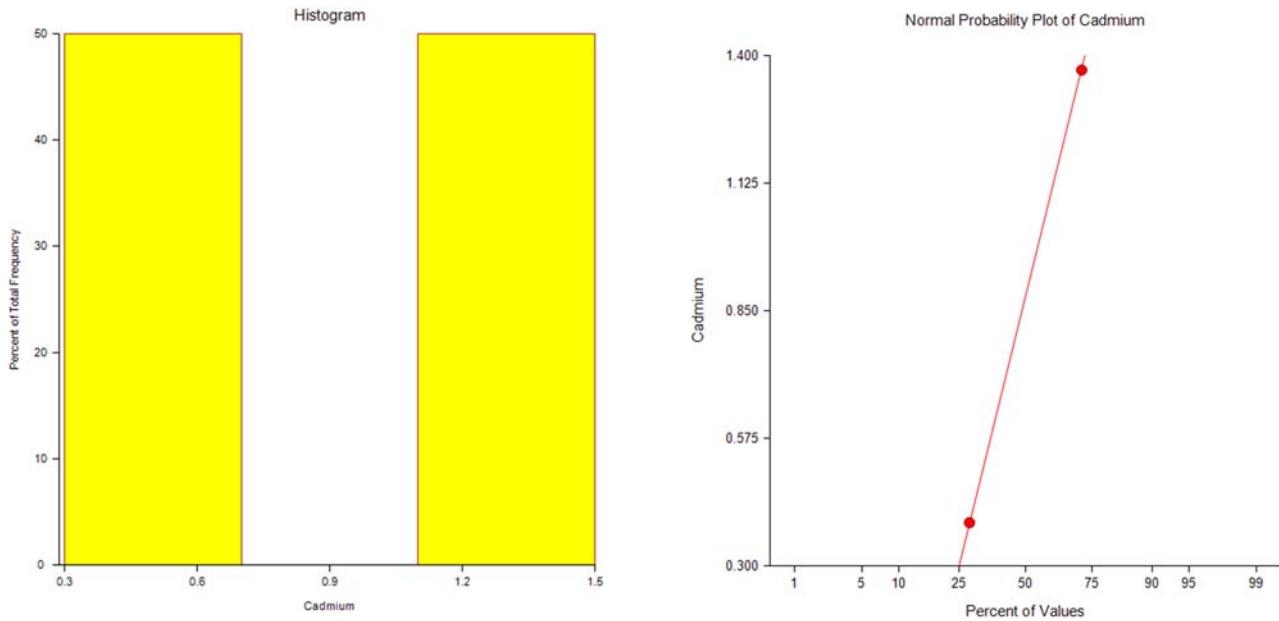
Normality Test Section of Cadmium when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of Cadmium when Reach=Yacht Club

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Percentile Section of Cadmium when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1.369			
95	1.369			
90	1.369			
85	1.369			
80	1.369			
75	1.369			
70	1.369			
65	1.320217			
60	1.17387			
55	1.027522			
50	0.881175			
45	0.7348275			
40	0.58848			
35	0.4421325			
30	0.39335			
25	0.39335			
20	0.39335			
15	0.39335			
10	0.39335			
5	0.39335			
1	0.39335			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Cadmium when Reach=Yacht Club**Summary Section of Chromium when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	833.75	270.7581	95.72743	362	1280	918

Counts Section of Chromium when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	6670	6074282	513169.5

Means Section of Chromium when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	833.75	828.5	789.0935	736.5808	6670	
Std Error	95.72743				765.8195	
95% LCL	607.3906	362	576.5281	535.2227	4859.125	
95% UCL	1060.109	1010	1080.032	1180.822	8480.875	
T-Value	8.709624					
Prob Level	5.277312E-05					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Chromium when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	73309.93	270.7581	280.5695	95.72743	312.75	918
Std Error	34537.82	90.19835		31.88993		
95% LCL	32047.53	179.0182		63.2925		
95% UCL	303674.1	551.0663		194.8314		

Skewness and Kurtosis Section of Chromium when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.103514	2.775638	-0.1291046	0.928839	0.3247473	0.2314424
Std Error	0.4009094	0.993234			0.0865036	

Quartile Section of Chromium when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	362	688.75	828.5	1001.5	1280
95% LCL			362		
95% UCL			1010		

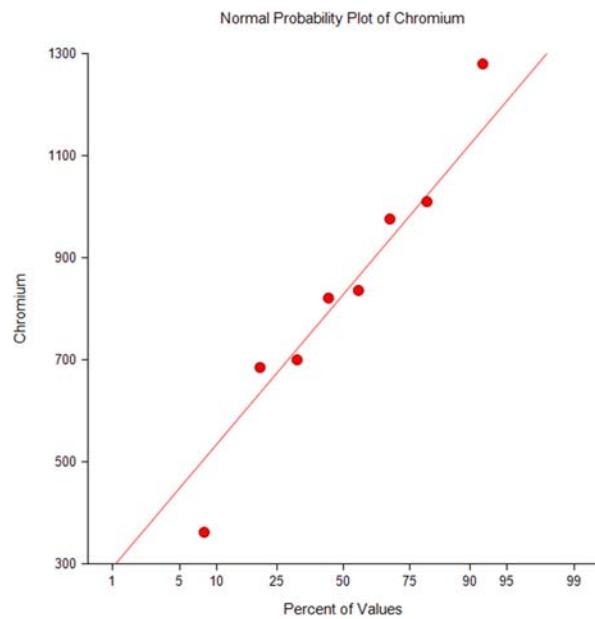
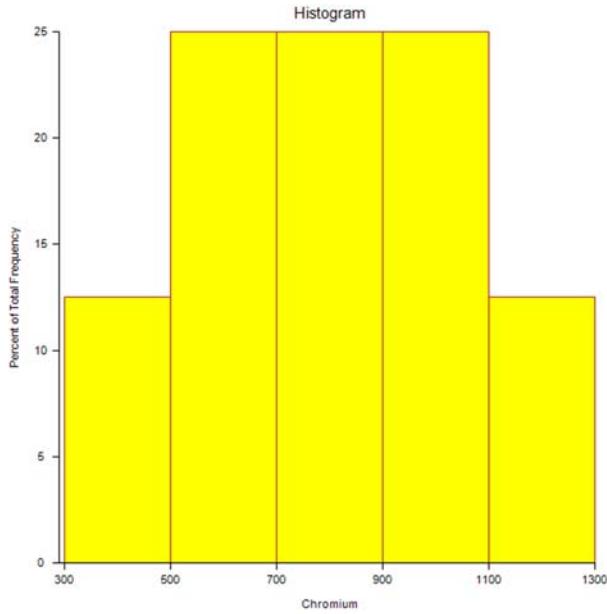
Normality Test Section of Chromium when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9752053	0.9354303			Can't reject normality
Anderson-Darling	0.239068	0.7796445			Can't reject normality
Martinez-Iglewicz	1.102859		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1325393		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.174441	0.8615189	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.7640	0.444865	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.6141	0.735603	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Chromium when Reach=Reference

Descriptive Statistics Report

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Percentile Section of Chromium when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1280			
95	1280			
90	1280			
85	1185.5			
80	1064			
75	1001.5			
70	986.2			
65	955	685	1280	96.45647
60	892	685	1280	97.46841
55	835.25	685	1280	97.35036
50	828.5	362	1010	96.09375
45	821.75	362	1010	97.35036
40	772.6	362	1010	97.46841
35	718.15	362	1010	96.45647
30	695.5			
25	688.75			
20	620.4			
15	475.05			
10	362			
5	362			
1	362			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Chromium when Reach=Reference

Depth	Stem	Leaves
1	T	3
1	F	
3	S	67
(3)	.	889
2	1*	0
1	T	2

Unit = 100 Example: 1 |2 Represents 1200

Descriptive Statistics Report

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Summary Section of Chromium when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	734.8333	396.5551	114.4756	144	1190	1046

Counts Section of Chromium when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	11	8818	8209576	1729816

Means Section of Chromium when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	734.8333	830.5	597.2017	445.6547	8818	1120
Std Error	114.4756				1373.707	
95% LCL	482.8742	247	369.9168	284.8291	5794.491	
95% UCL	986.7924	1120	964.1355	1023.644	11841.51	
T-Value	6.419126					
Prob Level	4.948149E-05					
Count	12		12	12		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Chromium when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	157256	396.5551	405.6584	114.4756	835.75	1046
Std Error	33194.64	59.19014		17.08672		
95% LCL	78914.77	280.9177		81.09396		
95% UCL	453335.9	673.3022		194.3656		

Skewness and Kurtosis Section of Chromium when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.3522392	1.534691	-0.4046921	-1.59488	0.5396532	0.3987558
Std Error	0.4923424	0.4761037			0.11891	

Quartile Section of Chromium when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	162.9	281.75	830.5	1117.5	1169
95% LCL		144	247	801	
95% UCL		860	1120	1190	

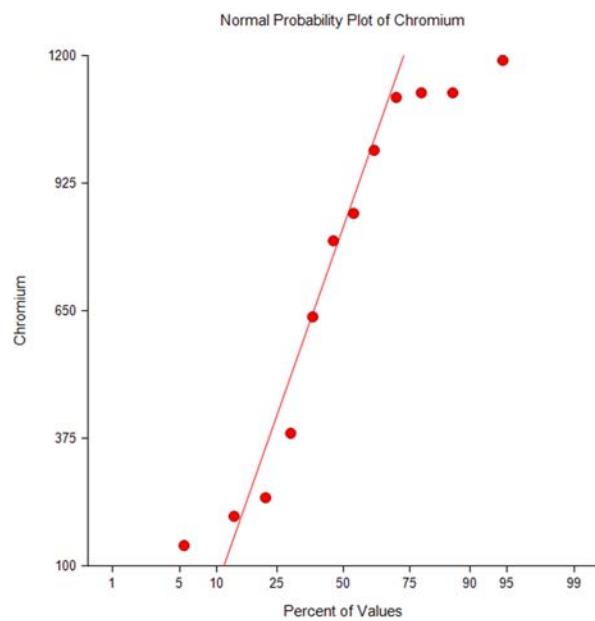
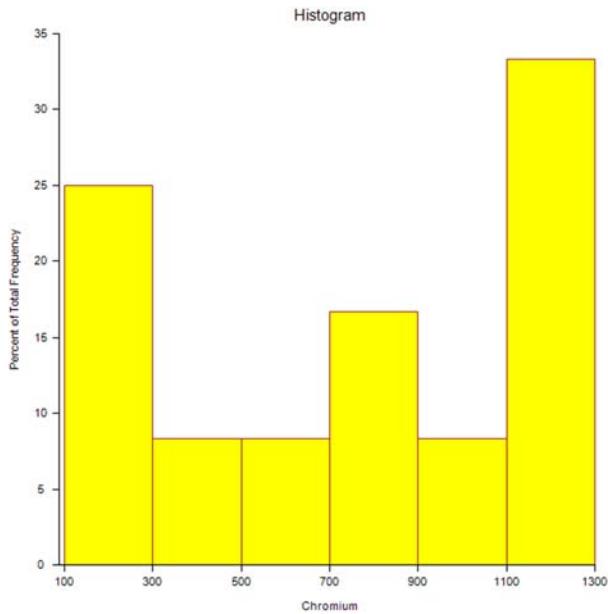
Normality Test Section of Chromium when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.8760185	0.0779509			Can't reject normality
Anderson-Darling	0.6225537	0.1050572			Can't reject normality
Martinez-Iglewicz	0.9905191		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.1438113		0.222	0.242	Can't reject normality
D'Agostino Skewness	-0.6613758	0.5083714	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.8068	0.070794	1.645	1.96	Can't reject normality
D'Agostino Omnibus	3.7019	0.157086	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Chromium when Reach=Site

Descriptive Statistics Report

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Percentile Section of Chromium when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1190			
95	1190			
90	1169			
85	1123.5			
80	1120			
75	1117.5	801	1190	95.40709
70	1111	637	1190	97.66693
65	1047.3	386	1120	95.19489
60	968.8	386	1120	96.51417
55	880.4	386	1120	95.6136
50	830.5	247	1120	96.14258
45	776.4	207	1110	95.6136
40	669.8	207	1110	96.51417
35	524.05	144	996	96.88046
30	372.1	144	996	97.66693
25	281.75	144	860	95.40709
20	231			
15	203.85			
10	162.9			
5	144			
1	144			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Chromium when Reach=Site

Depth	Stem	Leaves
1	0*	1
4	T	223
4	F	
5	S	6
(3)	.	889
4	1*	1111

Unit = 100 Example: 1 |2 Represents 1200

Descriptive Statistics Report

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Summary Section of Chromium when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	440.5	137.8858	97.5	343	538	195

Counts Section of Chromium when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	881	407093	19012.5

Means Section of Chromium when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	440.5	440.5	429.5742	418.9194	881	
Std Error	97.5				195	
95% LCL	-798.355		24.60832	109.8839	-1596.71	
95% UCL	1679.355		7498.847	-231.1428	3358.71	
T-Value	4.517949					
Prob Level	0.1386733					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Chromium when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	19012.5	137.8858	172.8143	97.5	195	195
Std Error	0	0		0		
95% LCL	3784.421	61.51765		43.49955		
95% UCL	1.935964E+07	4399.958		3111.24		

Skewness and Kurtosis Section of Chromium when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.3130212	0.2213394
Std Error					0.04899113	

Quartile Section of Chromium when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	343	343	440.5	538	538
95% LCL					
95% UCL					

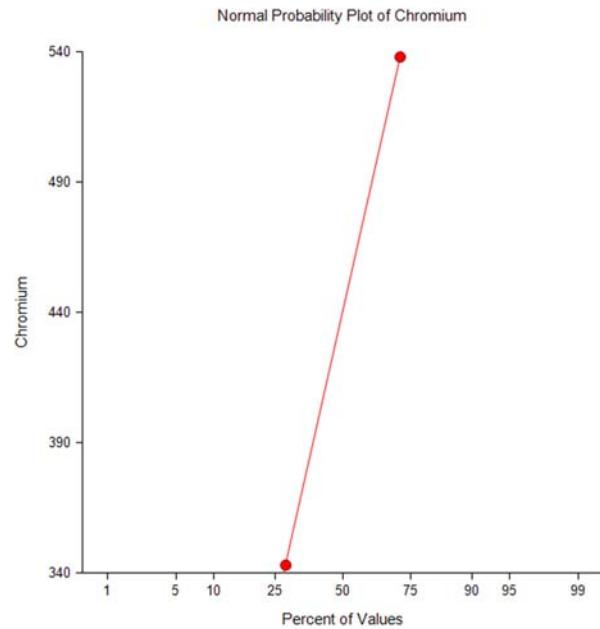
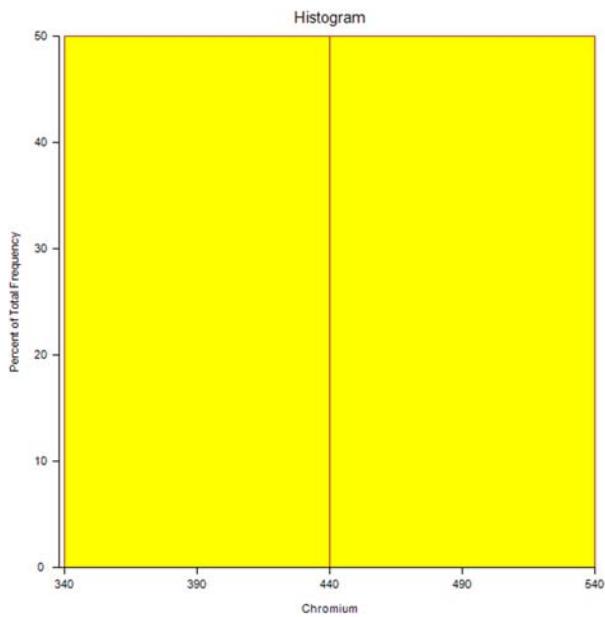
Normality Test Section of Chromium when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of Chromium when Reach=Yacht Club

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Percentile Section of Chromium when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	538			
95	538			
90	538			
85	538			
80	538			
75	538			
70	538			
65	528.25			
60	499			
55	469.75			
50	440.5			
45	411.25			
40	382			
35	352.75			
30	343			
25	343			
20	343			
15	343			
10	343			
5	343			
1	343			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Chromium when Reach=Yacht Club**Summary Section of Copper when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	113.35	24.6525	8.715975	70.2	150	79.8

Counts Section of Copper when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	7	906.8	107040	4254.22

Means Section of Copper when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	113.35	119.5	110.7831	107.9837	906.8	120
Std Error	8.715975				69.7278	
95% LCL	92.74	70.2	90.98418	88.91641	741.92	
95% UCL	133.96	133	134.8903	137.4609	1071.68	
T-Value	13.00486					
Prob Level	3.700134E-06					
Count	8		8	8		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Copper when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	607.7457	24.6525	25.54582	8.715975	34.3	79.8
Std Error	261.0081	7.486486		2.646873		
95% LCL	265.6768	16.29959		5.762777		
95% UCL	2517.485	50.17455		17.73938		

Skewness and Kurtosis Section of Copper when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.3296965	2.475551	-0.4112037	0.2986567	0.2174901	0.1456067
Std Error	0.4464857	0.8831456			0.05312679	

Quartile Section of Copper when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	70.2	95.45	119.5	129.75	150
95% LCL			70.2		
95% UCL			133		

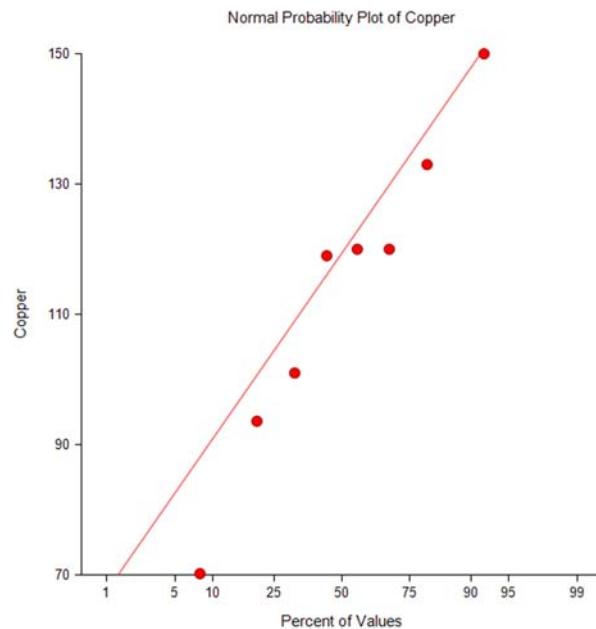
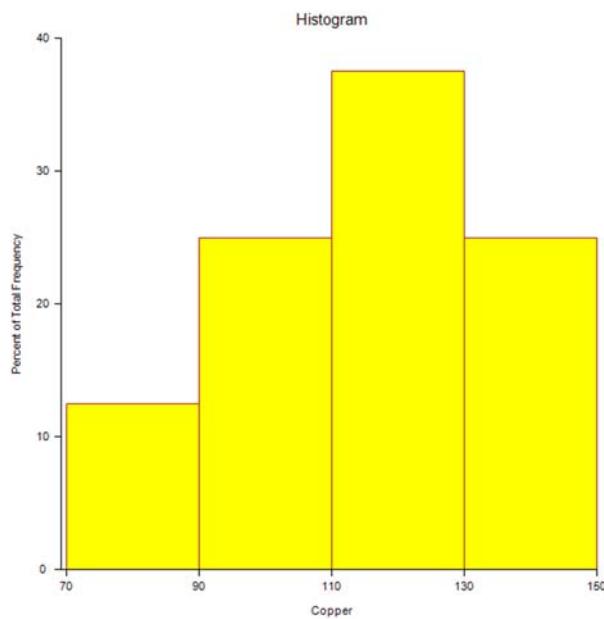
Normality Test Section of Copper when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9667167	0.8710722			Can't reject normality
Anderson-Darling	0.2729765	0.66781			Can't reject normality
Martinez-Iglewicz	1.11725		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1436765		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.5547732	0.5790498	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.3765	0.706550	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.4495	0.798708	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Copper when Reach=Reference

Descriptive Statistics Report

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Percentile Section of Copper when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	150			
95	150			
90	150			
85	144.05			
80	136.4			
75	129.75			
70	123.9			
65	120	93.6	150	96.45647
60	120	93.6	150	97.46841
55	119.95	93.6	150	97.35036
50	119.5	70.2	133	96.09375
45	119.05	70.2	133	97.35036
40	111.8	70.2	133	97.46841
35	103.7	70.2	133	96.45647
30	98.78			
25	95.45			
20	88.92			
15	78.39			
10	70.2			
5	70.2			
1	70.2			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Copper when Reach=Reference

Depth	Stem	Leaves
1	7	0
1	8	
2	9	3
3	10	1
4	11	9
4	12	00
2	13	3
1	14	
1	15	0

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

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Summary Section of Copper when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	295.75	354.3707	102.298	121	1210	1089

Counts Section of Copper when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	10	3549	2430981	1381364

Means Section of Copper when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	295.75	150.5	201.8157	168.3147	3549	
Std Error	102.298				1227.576	
95% LCL	70.59362	129	123.3635	132.7714	847.1235	
95% UCL	520.9064	202	330.1592	229.845	6250.876	
T-Value	2.891063					
Prob Level	0.0146779					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Variation Section of Copper when Reach=Site

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	125578.6	354.3707	362.5055	102.298	63	1089
Std Error	73176.53	146.0155		42.15105		
95% LCL	63018.3	251.0345		72.46741		
95% UCL	362016.6	601.6782		173.6895		

Skewness and Kurtosis Section of Copper when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	1.943552	5.074683	2.232971	4.029774	1.19821	1.095792
Std Error	1.049517	4.241607			0.1121334	

Quartile Section of Copper when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	121.9	130	150.5	193	1105.6
95% LCL		121	129	139	
95% UCL		162	202	1210	

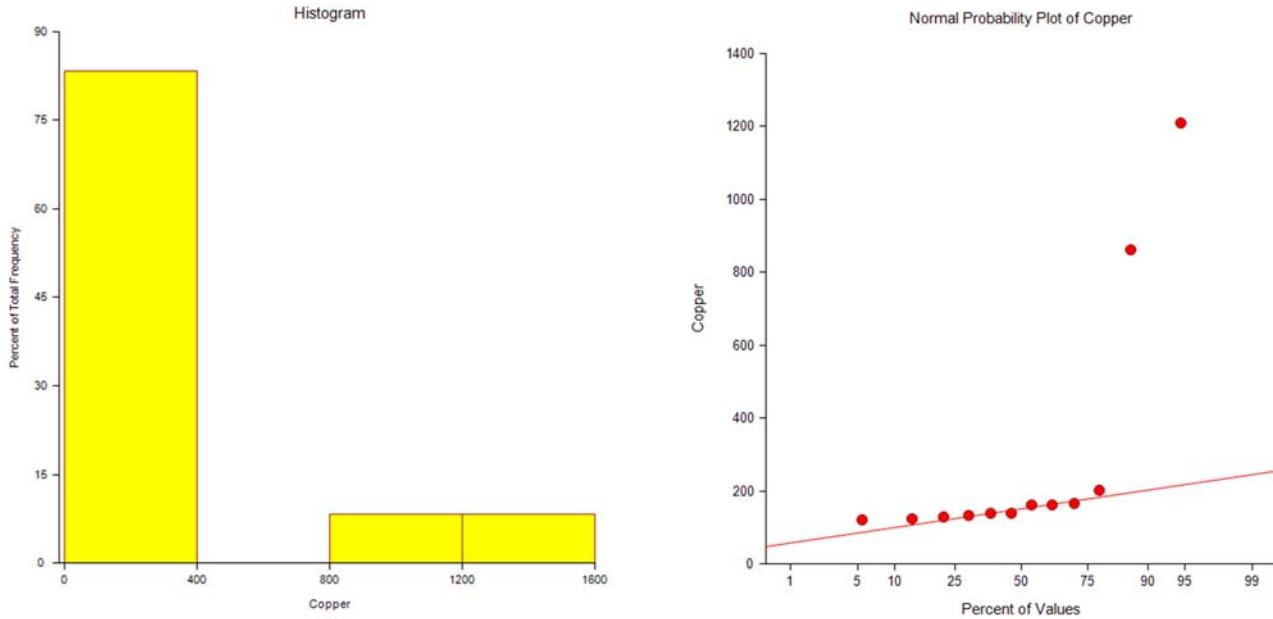
Normality Test Section of Copper when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.5438951	3.794605E-05			Reject normality
Anderson-Darling	2.874285	3.177728E-07			Reject normality
Martinez-Iglewicz	207.6424		1.356672	1.719144	Reject normality
Kolmogorov-Smirnov	0.4376566		0.222	0.242	Reject normality
D'Agostino Skewness	3.159231	0.001581858	1.645	1.96	Reject normality
D'Agostino Kurtosis	2.3038	0.021231	1.645	1.96	Reject normality
D'Agostino Omnibus	15.2885	0.000479	4.605	5.991	Reject normality

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Plots Section of Copper when Reach=Site

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Percentile Section of Copper when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1210			
95	1210			
90	1105.6			
85	879.4			
80	466			
75	193	139	1210	95.40709
70	169.6	139	1210	97.66693
65	163.8	133	862	95.19489
60	162	133	862	96.51417
55	162	133	862	95.6136
50	150.5	129	202	96.14258
45	139	124	166	95.6136
40	139	124	166	96.51417
35	136.3	121	162	96.88046
30	132.6	121	162	97.66693
25	130	121	162	95.40709
20	127			
15	123.85			
10	121.9			
5	121			
1	121			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Copper when Reach=Site

Depth	Stem	Leaves
3	12	149
6	13	399
6	14	
6	15	
6	16	226
3	17	
3	18	
3	19	
3	20	2
High		862, 1210

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

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Summary Section of Copper when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	308.75	224.5064	158.75	150	467.5	317.5
Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	617.5	241056.3	50403.13

Means Section of Copper when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	308.75	308.75	264.8112	227.1255	617.5	
Std Error	158.75				317.5	
95% LCL	-1708.36		0.1934065	30.15014	-3416.72	
95% UCL	2325.86		362578.3	-41.04814	4651.72	
T-Value	1.944882					
Prob Level	0.302343					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Copper when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	50403.13	224.5064	281.377	158.75	317.5	317.5
Std Error	0	0		0		
95% LCL	10032.7	100.1633		70.82618		
95% UCL	5.13234E+07	7164.035		5065.738		

Skewness and Kurtosis Section of Copper when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.7271463	0.5141701
Std Error					0.2643708	

Quartile Section of Copper when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	150	150	308.75	467.5	467.5
95% LCL					
95% UCL					

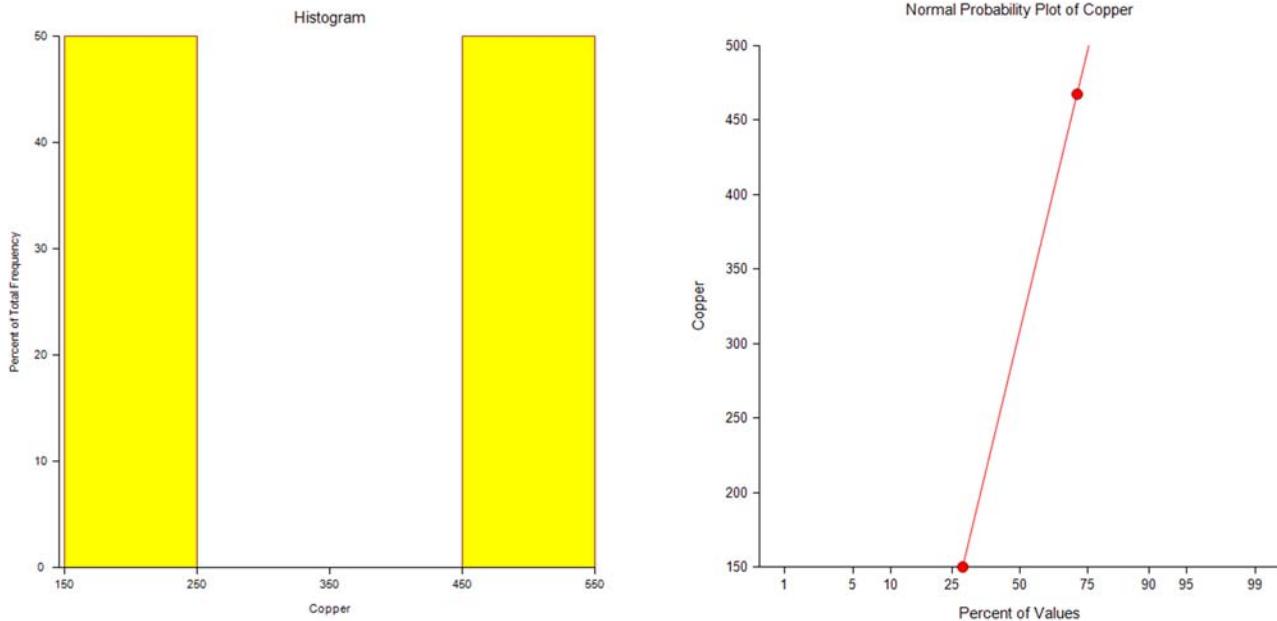
Normality Test Section of Copper when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

Descriptive Statistics Report

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Plots Section of Copper when Reach=Yacht Club

Descriptive Statistics Report
Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Copper when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	467.5			
95	467.5			
90	467.5			
85	467.5			
80	467.5			
75	467.5			
70	467.5			
65	451.625			
60	404			
55	356.375			
50	308.75			
45	261.125			
40	213.5			
35	165.875			
30	150			
25	150			
20	150			
15	150			
10	150			
5	150			
1	150			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Copper when Reach=Yacht Club

Summary Section of Lead when Reach=Reference

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	223	60.44833	21.37171	132	332	200

Counts Section of Lead when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	1784	423410	25578

Means Section of Lead when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	223	224	215.6862	208.2188	1784	
Std Error	21.37171				170.9737	
95% LCL	172.4639	132	170.629	167.1567	1379.711	
95% UCL	273.5361	253	272.6417	276.0244	2188.289	
T-Value	10.43435					
Prob Level	1.615369E-05					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Lead when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	3654	60.44833	62.63877	21.37171	77	200
Std Error	1683.998	19.69891		6.964617		
95% LCL	1597.351	39.96687		14.13042		
95% UCL	15136.08	123.0288		43.49725		

Skewness and Kurtosis Section of Lead when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.2854659	2.699166	0.3560385	0.7682494	0.2710687	0.1953125
Std Error	0.3713407	0.9725227			0.0618653	

Quartile Section of Lead when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	132	175.75	224	252.75	332
95% LCL			132		
95% UCL			253		

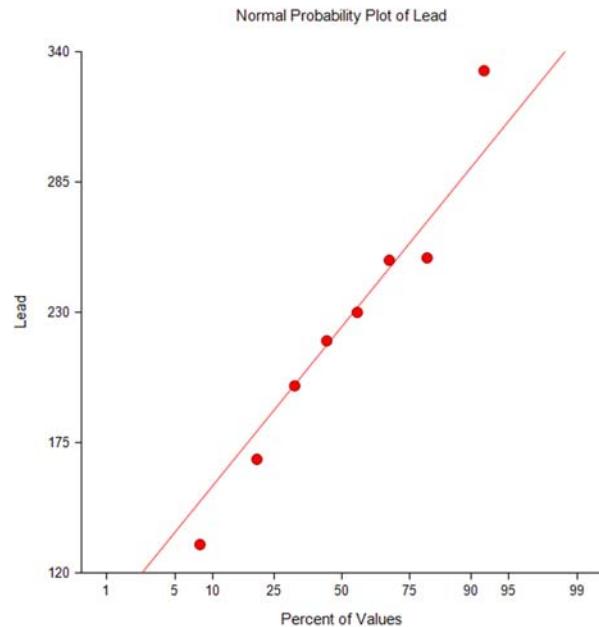
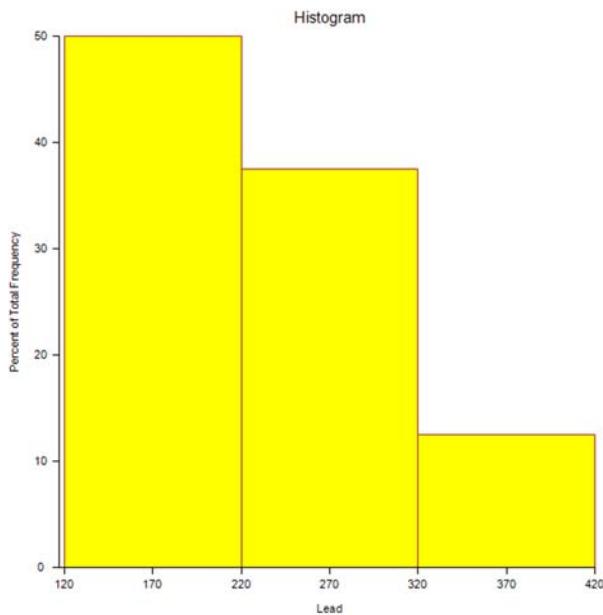
Normality Test Section of Lead when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9742234	0.9289315			Can't reject normality
Anderson-Darling	0.2203177	0.8344806			Can't reject normality
Martinez-Iglewicz	1.065897		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1848443		0.265	0.288	Can't reject normality
D'Agostino Skewness	0.480546	0.6308392	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.6702	0.502730	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.6801	0.711737	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Lead when Reach=Reference

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Percentile Section of Lead when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	332			
95	332			
90	332			
85	304.35			
80	268.8			
75	252.75			
70	252.3			
65	248.7	168	332	96.45647
60	238.8	168	332	97.46841
55	229.4	168	332	97.35036
50	224	132	253	96.09375
45	218.6	132	253	97.35036
40	210.4	132	253	97.46841
35	201.85	132	253	96.45647
30	189.7			
25	175.75			
20	160.8			
15	144.6			
10	132			
5	132			
1	132			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Lead when Reach=Reference

Depth	Stem	Leaves
1	1*	3
3	.	69
(2)	2*	13
3	.	55
1	3*	3

Unit = 10 Example: 1 |2 Represents 120

Descriptive Statistics Report

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Summary Section of Lead when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	332.25	102.0874	29.4701	237	622	385

Counts Section of Lead when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	11	3987	1439321	114640.3

Means Section of Lead when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	332.25	302.5	321.3454	312.9946	3987	264
Std Error	29.4701				353.6412	
95% LCL	267.3867	264	273.4412	275.2112	3208.641	
95% UCL	397.1133	387	377.6419	362.8036	4765.359	
T-Value	11.27414					
Prob Level	2.203157E-07					
Count	12		12	12		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Lead when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	10421.84	102.0874	104.4309	29.4701	104.75	385
Std Error	7104.821	49.21142		14.20611		
95% LCL	5229.927	72.31823		20.87647		
95% UCL	30043.98	173.332		50.03663		

Skewness and Kurtosis Section of Lead when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	2.047241	6.576974	2.352101	6.416748	0.3072608	0.1898072
Std Error	0.8314396	4.987751			0.08313702	

Quartile Section of Lead when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	245.1	268.5	302.5	373.25	552.1
95% LCL		237	264	302	
95% UCL		303	387	622	

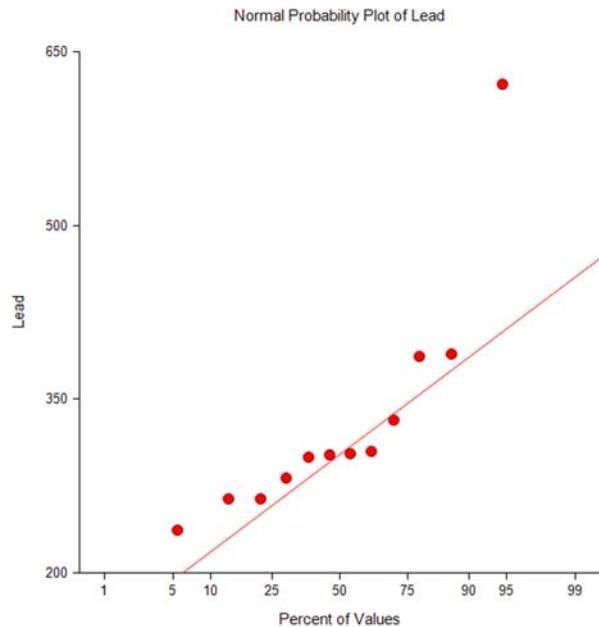
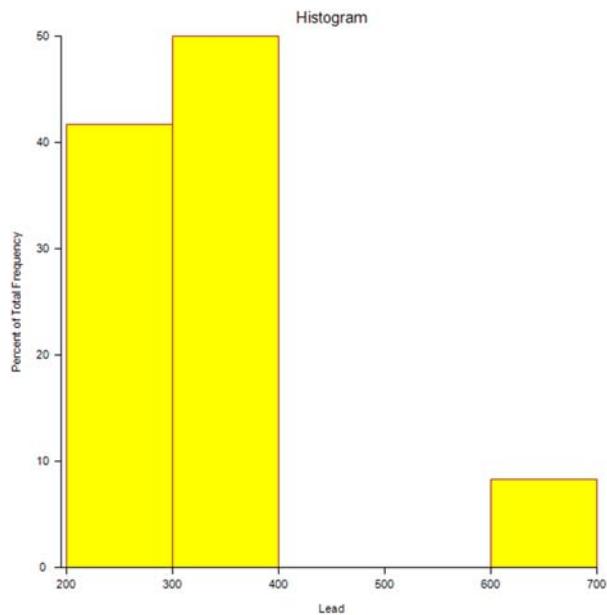
Normality Test Section of Lead when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.7316692	0.001731376			Reject normality
Anderson-Darling	1.316585	0.002048915			Reject normality
Martinez-Iglewicz	4.804124		1.356672	1.719144	Reject normality
Kolmogorov-Smirnov	0.2719044		0.222	0.242	Reject normality
D'Agostino Skewness	3.287631	0.001010343	1.645	1.96	Reject normality
D'Agostino Kurtosis	2.9423	0.003257	1.645	1.96	Reject normality
D'Agostino Omnibus	19.4659	0.000059	4.605	5.991	Reject normality

Descriptive Statistics Report

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Plots Section of Lead when Reach=Site

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Percentile Section of Lead when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	622			
95	622			
90	552.1			
85	400.65			
80	387.8			
75	373.25	302	622	95.40709
70	337.5	300	622	97.66693
65	317.15	282	389	95.19489
60	304.6	282	389	96.51417
55	303.3	282	389	95.6136
50	302.5	264	387	96.14258
45	301.7	264	332	95.6136
40	300.4	264	332	96.51417
35	291.9	237	305	96.88046
30	280.2	237	305	97.66693
25	268.5	237	303	95.40709
20	264			
15	262.65			
10	245.1			
5	237			
1	237			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Lead when Reach=Site

Depth	Stem	Leaves
1	2T	3
1	F	
3	S	66
4	.	8
(4)	3*	0000
4	T	3
3	F	
3	S	
3	.	88
High		62

Unit = 10 Example: 1 |2 Represents 120

Descriptive Statistics Report

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Summary Section of Lead when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	515	400.2224	283	232	798	566

Counts Section of Lead when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	1030	690628	160178

Means Section of Lead when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	515	515	430.2743	359.4874	1030	
Std Error	283				566	
95% LCL	-3080.856		0.1679621	45.03588	-6161.712	
95% UCL	4110.856		1102249	-60.09239	8221.712	
T-Value	1.819788					
Prob Level	0.3198826					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Lead when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	160178	400.2224	501.6044	283	566	566
Std Error	0	0		0		
95% LCL	31883.29	178.5589		126.2602		
95% UCL	1.631026E+08	12771.16		9030.575		

Skewness and Kurtosis Section of Lead when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.777131	0.5495146
Std Error					0.3019662	

Quartile Section of Lead when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	232	232	515	798	798
95% LCL					
95% UCL					

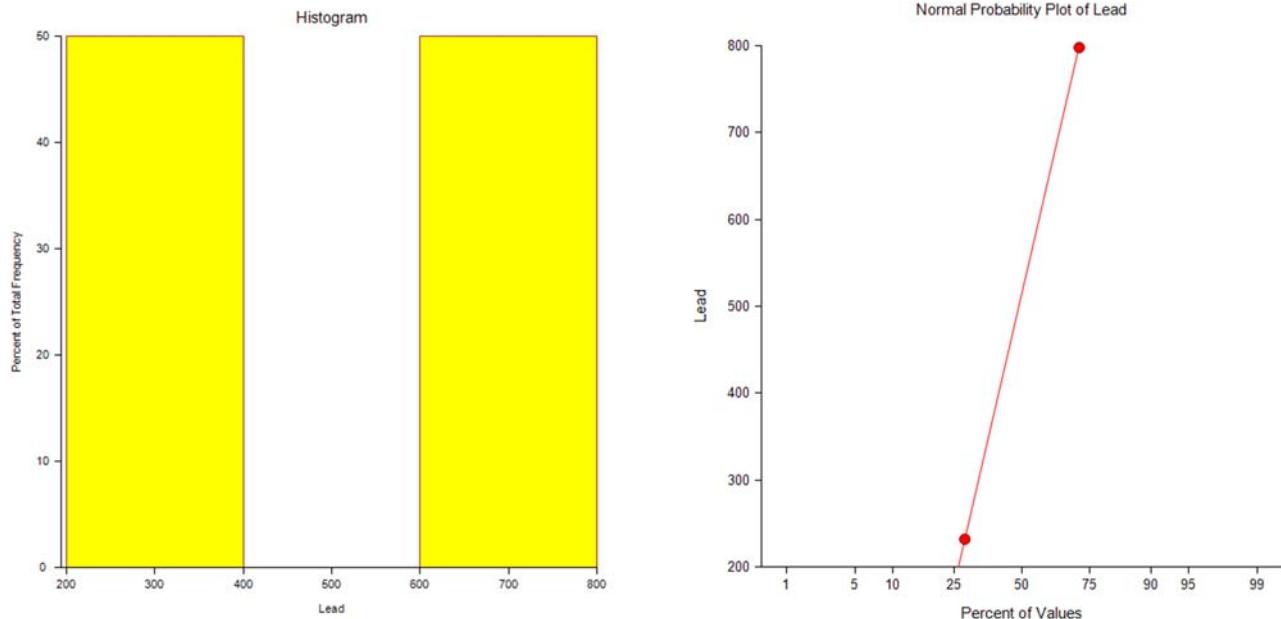
Normality Test Section of Lead when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

Descriptive Statistics Report

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Plots Section of Lead when Reach=Yacht Club

Descriptive Statistics Report
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Percentile Section of Lead when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	798			
95	798			
90	798			
85	798			
80	798			
75	798			
70	798			
65	769.7			
60	684.8			
55	599.9			
50	515			
45	430.1			
40	345.2			
35	260.3			
30	232			
25	232			
20	232			
15	232			
10	232			
5	232			
1	232			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Lead when Reach=Yacht Club

Summary Section of Mercury when Reach=Reference

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	1.437875	0.3458226	0.1222668	0.973	1.89	0.917

Counts Section of Mercury when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	11.503	17.37703	0.8371529

Means Section of Mercury when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.437875	1.47	1.399828	1.361123	11.503	
Std Error	0.1222668				0.978134	
95% LCL	1.14876	0.973	1.134664	1.120358	9.190081	
95% UCL	1.72699	1.74	1.726959	1.733693	13.81592	
T-Value	11.76015					
Prob Level	7.280145E-06					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Descriptive Statistics Report

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Variation Section of Mercury when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.1195933	0.3458226	0.3583541	0.1222668	0.655	0.917
Std Error	0.03010551	0.06155702		0.0217637		
95% LCL	0.05228035	0.228649		0.08083961		
95% UCL	0.4953951	0.7038431		0.2488461		

Skewness and Kurtosis Section of Mercury when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.1167306	1.506954	-0.1455887	-1.735397	0.2405095	0.2021258
Std Error	0.5739182	0.2989301			0.03836996	

Quartile Section of Mercury when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.973	1.08	1.47	1.735	1.89
95% LCL			0.973		
95% UCL			1.74		

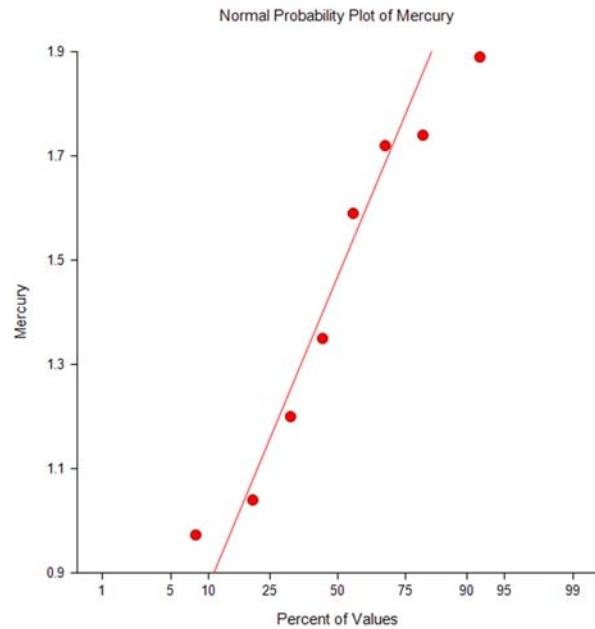
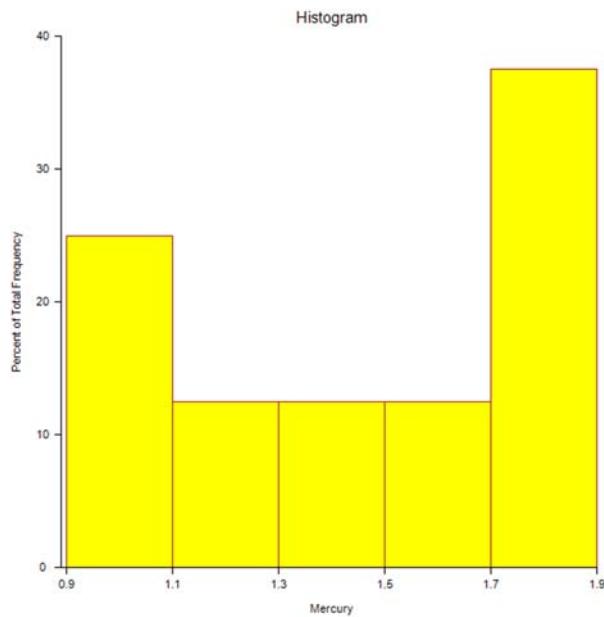
Normality Test Section of Mercury when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9268618	0.4879641			Can't reject normality
Anderson-Darling	0.3231971	0.526386			Can't reject normality
Martinez-Iglewicz	1.026247		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1292272		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.1967048	0.8440585	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.3966	0.162533	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.9892	0.369873	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Mercury when Reach=Reference

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Mercury when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1.89			
95	1.89			
90	1.89			
85	1.8375			
80	1.77			
75	1.735			
70	1.726			
65	1.7005	1.04	1.89	96.45647
60	1.642	1.04	1.89	97.46841
55	1.578	1.04	1.89	97.35036
50	1.47	0.973	1.74	96.09375
45	1.362	0.973	1.74	97.35036
40	1.29	0.973	1.74	97.46841
35	1.2225	0.973	1.74	96.45647
30	1.152			
25	1.08			
20	1.0266			
15	0.99645			
10	0.973			
5	0.973			
1	0.973			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Mercury when Reach=Reference

Depth	Stem	Leaves
1	.	9
2	1*	0
4	T	23
4	F	5
3	S	77
1	.	8

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Mercury when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	1.2835	0.708692	0.2045817	0.293	2.3	2.007

Counts Section of Mercury when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	12	15.402	25.29315	5.524687

Means Section of Mercury when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.2835	1.48	1.043703	0.7940885	15.402	
Std Error	0.2045817				2.454981	
95% LCL	0.8332186	0.4	0.6513824	0.5217744	9.998624	
95% UCL	1.733781	1.9	1.672314	1.660926	20.80538	
T-Value	6.273776					
Prob Level	6.055259E-05					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Mercury when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.5022443	0.708692	0.7249605	0.2045817	1.413	2.007
Std Error	0.1115208	0.1112714		0.03212127		
95% LCL	0.2520381	0.5020339		0.1449247		
95% UCL	1.447865	1.203272		0.3473548		

Skewness and Kurtosis Section of Mercury when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.2317525	1.591648	-0.2662634	-1.504382	0.5521558	0.3951577
Std Error	0.4721131	0.4171341			0.1181985	

Quartile Section of Mercury when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.3194	0.447	1.48	1.86	2.213
95% LCL		0.293	0.4	1.43	
95% UCL		1.53	1.9	2.3	

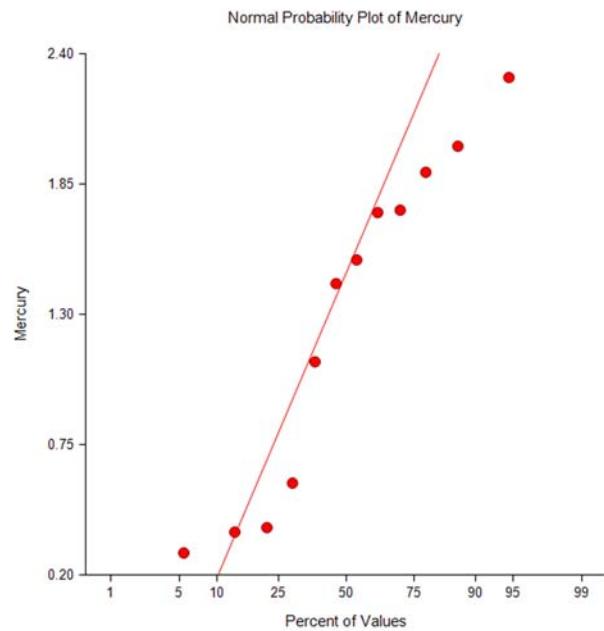
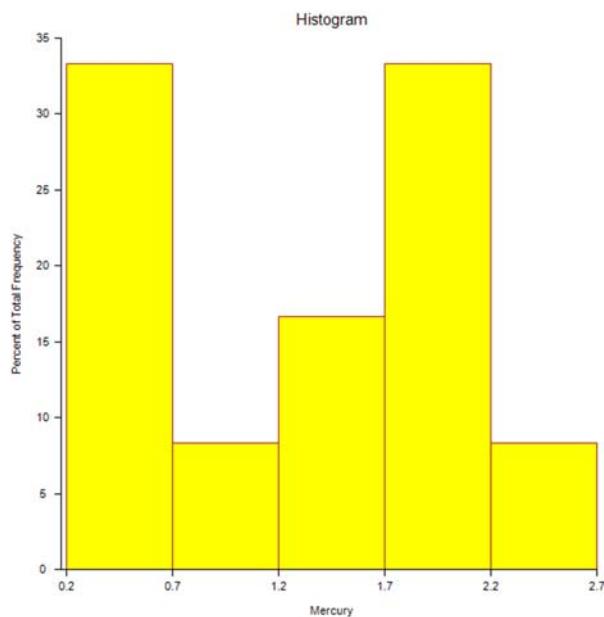
Normality Test Section of Mercury when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9054137	0.1862763			Can't reject normality
Anderson-Darling	0.5180858	0.1883226			Can't reject normality
Martinez-Iglewicz	0.9710702		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.170132		0.222	0.242	Can't reject normality
D'Agostino Skewness	-0.4368188	0.6622428	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.6407	0.100860	1.645	1.96	Can't reject normality
D'Agostino Omnibus	2.8827	0.236607	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Mercury when Reach=Site

Descriptive Statistics Report

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Percentile Section of Mercury when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	2.3			
95	2.3			
90	2.213			
85	2.0245			
80	1.944			
75	1.86	1.43	2.3	95.40709
70	1.756	1.1	2.3	97.66693
65	1.7345	0.588	2.01	95.19489
60	1.69	0.588	2.01	96.51417
55	1.56	0.588	2.01	95.6136
50	1.48	0.4	1.9	96.14258
45	1.3805	0.381	1.74	95.6136
40	1.166	0.381	1.74	96.51417
35	0.8696	0.293	1.73	96.88046
30	0.5692	0.293	1.73	97.66693
25	0.447	0.293	1.53	95.40709
20	0.3924			
15	0.3766			
10	0.3194			
5	0.293			
1	0.293			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Mercury when Reach=Site

Depth	Stem	Leaves
3	0*	234
4	.	5
6	1*	14
6	.	5779
2	2*	03

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Mercury when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	1.2645	0.5946768	0.4205	0.844	1.685	0.841

Counts Section of Mercury when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	2.529	3.551561	0.3536405

Means Section of Mercury when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.2645	1.2645	1.192535	1.124666	2.529	
Std Error	0.4205				0.841	
95% LCL	-4.078459		0.01475383	0.2152325	-8.156919	
95% UCL	6.607459		96.39124	-0.3486954	13.21492	
T-Value	3.007134					
Prob Level	0.2043795					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Mercury when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.3536405	0.5946768	0.7453169	0.4205	0.841	0.841
Std Error	0	0		0		
95% LCL	0.07039182	0.2653146		0.1876057		
95% UCL	360.0974	18.97623		13.41822		

Skewness and Kurtosis Section of Mercury when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.4702861	0.3325425
Std Error					0.1105845	

Quartile Section of Mercury when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.844	0.844	1.2645	1.685	1.685
95% LCL					
95% UCL					

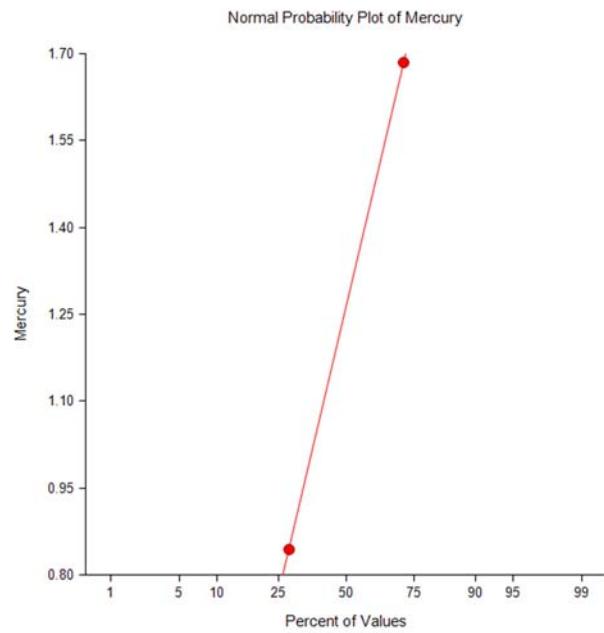
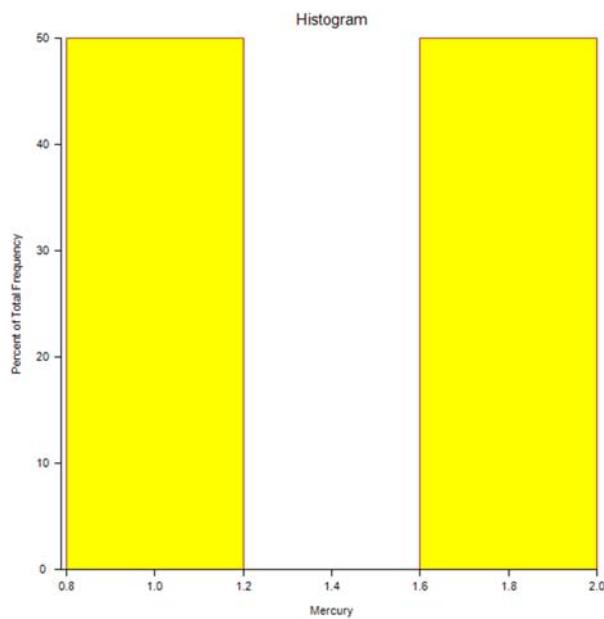
Normality Test Section of Mercury when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

Descriptive Statistics Report

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Plots Section of Mercury when Reach=Yacht Club

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Mercury when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	1.685			
95	1.685			
90	1.685			
85	1.685			
80	1.685			
75	1.685			
70	1.685			
65	1.64295			
60	1.5168			
55	1.39065			
50	1.2645			
45	1.13835			
40	1.0122			
35	0.88605			
30	0.844			
25	0.844			
20	0.844			
15	0.844			
10	0.844			
5	0.844			
1	0.844			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Mercury when Reach=Yacht Club**Summary Section of Nickel when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	28.1625	4.87118	1.722222	20.9	36.3	15.4

Counts Section of Nickel when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	225.3	6511.11	166.0988

Means Section of Nickel when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	28.1625	29.1	27.78876	27.41157	225.3	
Std Error	1.722222				13.77778	
95% LCL	24.09009	20.9	23.98829	23.84553	192.7207	
95% UCL	32.23491	30.8	32.19133	32.23173	257.8793	
T-Value	16.35242					
Prob Level	7.794297E-07					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Nickel when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	23.72839	4.87118	5.047696	1.722222	6.825	15.4
Std Error	9.42249	1.367781		0.4835836		
95% LCL	10.3729	3.220698		1.138689		
95% UCL	98.29089	9.914176		3.505191		

Skewness and Kurtosis Section of Nickel when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.08190035	2.261492	0.1021477	-0.1508656	0.1729669	0.1241409
Std Error	0.4417355	0.5796067			0.03503913	

Quartile Section of Nickel when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	20.9	23.95	29.1	30.775	36.3
95% LCL			20.9		
95% UCL			30.8		

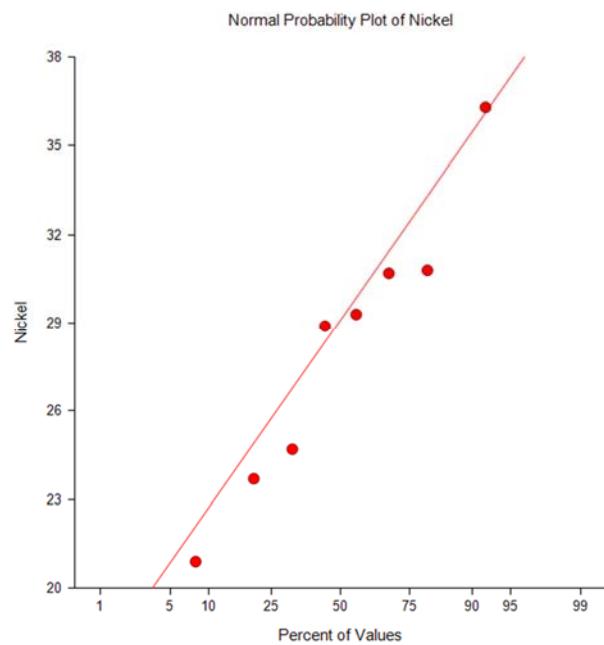
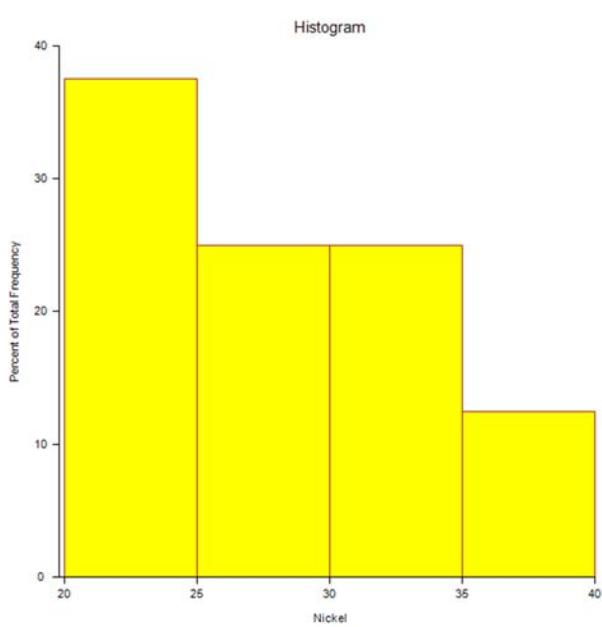
Normality Test Section of Nickel when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9614294	0.8236022			Can't reject normality
Anderson-Darling	0.2814406	0.6397964			Can't reject normality
Martinez-Iglewicz	1.041832		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1690987		0.265	0.288	Can't reject normality
D'Agostino Skewness	0.1380263	0.8902196	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.0641	0.948888	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.0232	0.988487	4.605	5.991	Can't reject normality

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Plots Section of Nickel when Reach=Reference

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Percentile Section of Nickel when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	36.3			
95	36.3			
90	36.3			
85	34.375			
80	31.9			
75	30.775			
70	30.73			
65	30.49	23.7	36.3	96.45647
60	29.86	23.7	36.3	97.46841
55	29.28	23.7	36.3	97.35036
50	29.1	20.9	30.8	96.09375
45	28.92	20.9	30.8	97.35036
40	27.22	20.9	30.8	97.46841
35	25.33	20.9	30.8	96.45647
30	24.4			
25	23.95			
20	23.14			
15	21.88			
10	20.9			
5	20.9			
1	20.9			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Nickel when Reach=Reference

Depth	Stem	Leaves
1	2*	0
2	T	3
3	F	4
3	S	
(2)	.	89
3	3*	00
1	T	
1	F	
1	S	6

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

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Summary Section of Nickel when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	35.2	5.706933	1.64745	27.3	47	19.7

Counts Section of Nickel when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	12	422.4	15226.74	358.26

Means Section of Nickel when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	35.2	34.25	34.78772	34.38702	422.4	
Std Error	1.64745				19.7694	
95% LCL	31.57399	31.5	31.4303	31.24821	378.8878	
95% UCL	38.82601	39.2	38.50379	38.22681	465.9121	
T-Value	21.36636					
Prob Level	2.627287E-10					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Nickel when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	32.56909	5.706933	5.837941	1.64745	7.3	19.7
Std Error	12.44233	1.541644		0.4450342		
95% LCL	16.34394	4.042764		1.167045		
95% UCL	93.88984	9.689677		2.797169		

Skewness and Kurtosis Section of Nickel when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.5049719	2.751353	0.5801685	0.338261	0.1621288	0.1192214
Std Error	0.3851829	0.8759967			0.02898543	

Quartile Section of Nickel when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	27.33	31.8	34.25	39.1	45.41
95% LCL		27.3	31.5	34.2	
95% UCL		34.3	39.2	47	

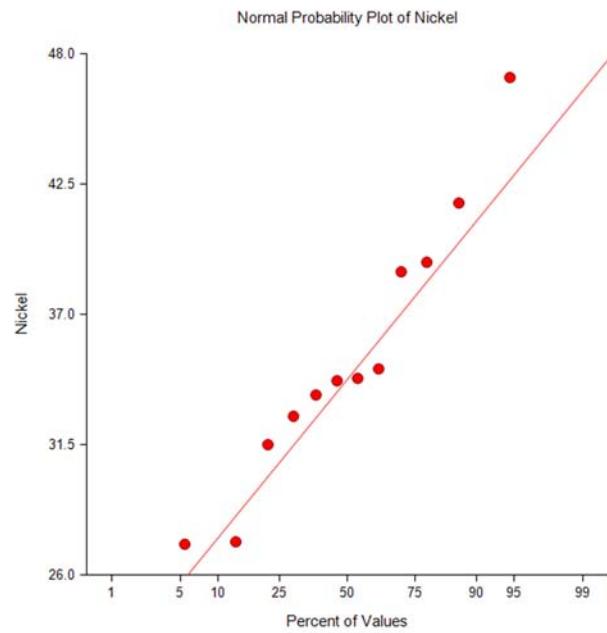
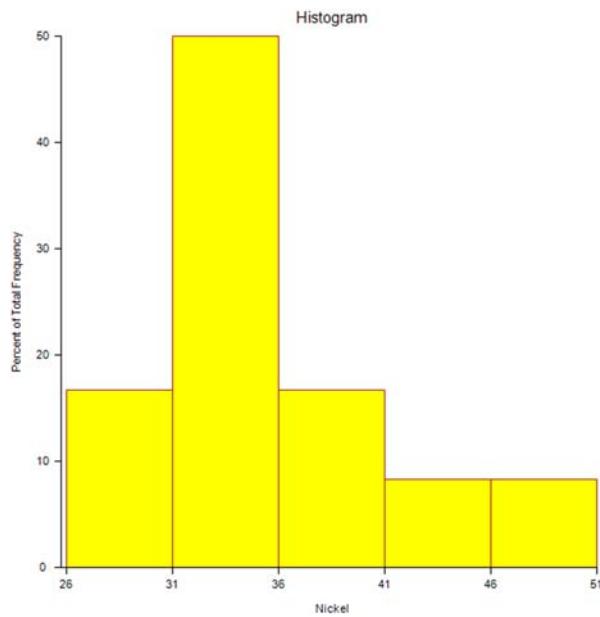
Normality Test Section of Nickel when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9470682	0.5945959			Can't reject normality
Anderson-Darling	0.336863	0.5049896			Can't reject normality
Martinez-Iglewicz	1.092955		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.2015744		0.222	0.242	Can't reject normality
D'Agostino Skewness	0.9415637	0.3464161	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.4922	0.622574	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.1288	0.568699	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Nickel when Reach=Site

Descriptive Statistics Report

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Percentile Section of Nickel when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	47			
95	47			
90	45.41			
85	41.965			
80	40.2			
75	39.1	34.2	47	95.40709
70	38.84	33.6	47	97.66693
65	36.545	32.7	41.7	95.19489
60	34.62	32.7	41.7	96.51417
55	34.36	32.7	41.7	95.6136
50	34.25	31.5	39.2	96.14258
45	34.11	27.4	38.8	95.6136
40	33.72	27.4	38.8	96.51417
35	33.195	27.3	34.7	96.88046
30	32.58	27.3	34.7	97.66693
25	31.8	27.3	34.3	95.40709
20	29.86			
15	27.395			
10	27.33			
5	27.3			
1	27.3			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Nickel when Reach=Site

Depth	Stem	Leaves
2	2.	77
(6)	3*	123444
4	.	89
2	4*	1
1	.	7

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

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Summary Section of Nickel when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	166.05	178.8273	126.45	39.6	292.5	252.9

Counts Section of Nickel when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	332.1	87124.41	31979.21

Means Section of Nickel when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	166.05	166.05	107.6243	69.7561	332.1	
Std Error	126.45				252.9	
95% LCL	-1440.65		0.0003271007	6.533918	-2881.299	
95% UCL	1772.75		3.541111E+07	-8.040123	3545.499	
T-Value	1.313167					
Prob Level	0.4143323					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Nickel when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	31979.21	178.8273	224.1268	126.45	252.9	252.9
Std Error	0	0		0		
95% LCL	6365.432	79.78365		56.41557		
95% UCL	3.256309E+07	5706.408		4035.04		

Skewness and Kurtosis Section of Nickel when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					1.076949	0.7615176
Std Error					0.5799091	

Quartile Section of Nickel when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	39.6	39.6	166.05	292.5	292.5
95% LCL					
95% UCL					

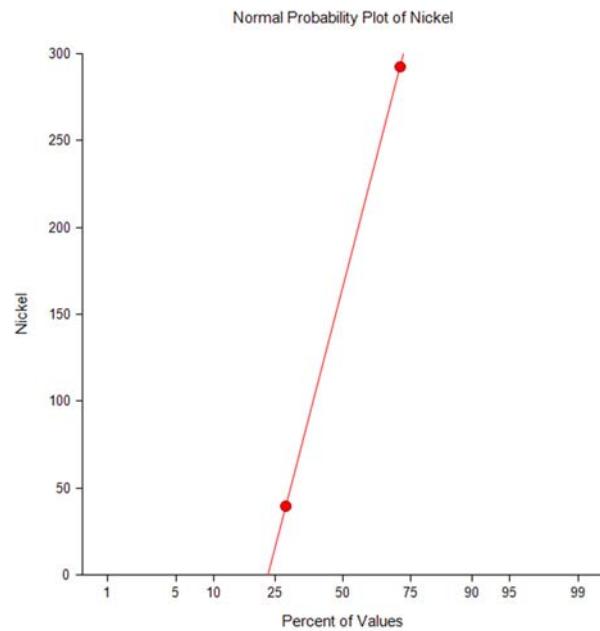
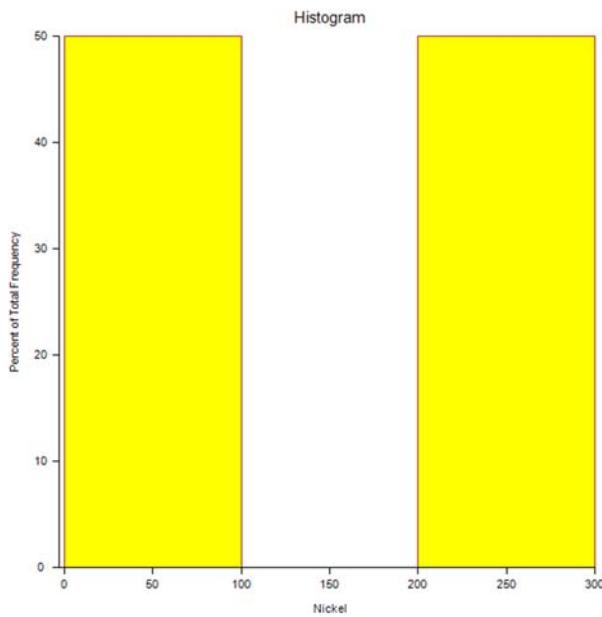
Normality Test Section of Nickel when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of Nickel when Reach=Yacht Club

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Percentile Section of Nickel when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	292.5			
95	292.5			
90	292.5			
85	292.5			
80	292.5			
75	292.5			
70	292.5			
65	279.855			
60	241.92			
55	203.985			
50	166.05			
45	128.115			
40	90.18			
35	52.245			
30	39.6			
25	39.6			
20	39.6			
15	39.6			
10	39.6			
5	39.6			
1	39.6			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Nickel when Reach=Yacht Club**Summary Section of Selenium when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	5.85375	0.8833045	0.3122953	4.51	7.45	2.94

Counts Section of Selenium when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	46.83	279.5927	5.461587

Means Section of Selenium when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	5.85375	5.955	5.795825	5.738239	46.83	
Std Error	0.3122953				2.498362	
95% LCL	5.115289	4.51	5.108572	5.091996	40.92231	
95% UCL	6.592211	6.26	6.575534	6.57236	52.73769	
T-Value	18.74428					
Prob Level	3.055162E-07					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Selenium when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.7802268	0.8833045	0.9153125	0.3122953	1.02	2.94
Std Error	0.3599673	0.2881626		0.1018808		
95% LCL	0.3410771	0.5840181		0.2064816		
95% UCL	3.231959	1.797765		0.6356059		

Skewness and Kurtosis Section of Selenium when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.2932025	2.702842	0.3656878	0.7759674	0.1508955	0.1106213
Std Error	0.3952776	0.9341124			0.03391996	

Quartile Section of Selenium when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	4.51	5.225	5.955	6.245	7.45
95% LCL			4.51		
95% UCL			6.26		

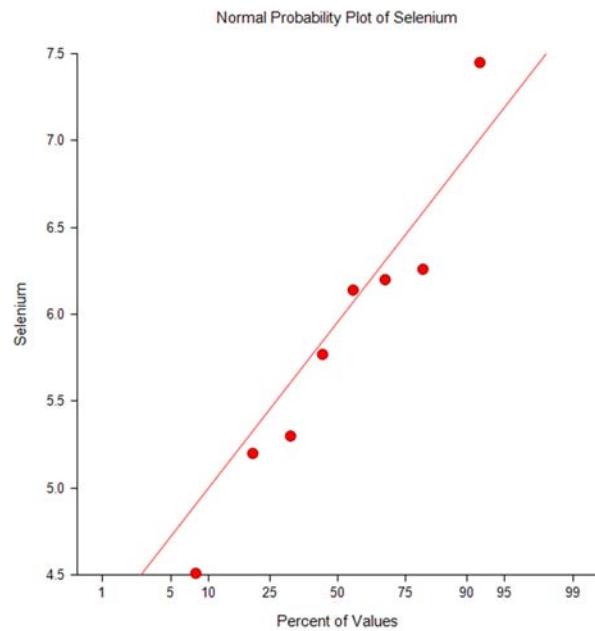
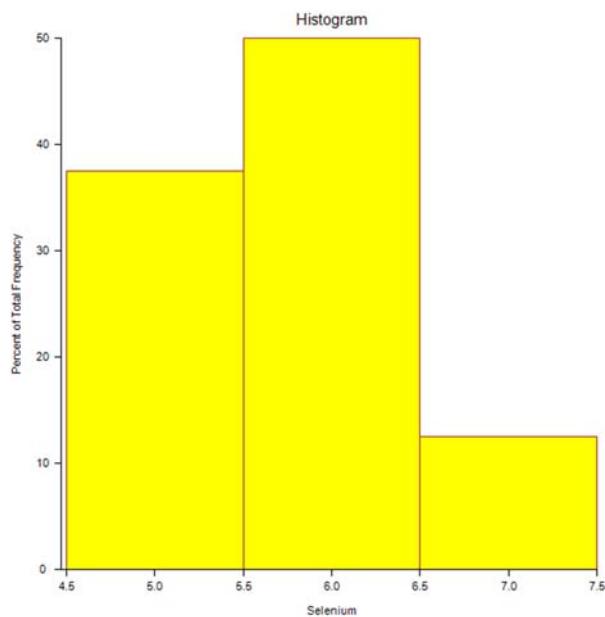
Normality Test Section of Selenium when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9624088	0.8327099			Can't reject normality
Anderson-Darling	0.2799749	0.6445926			Can't reject normality
Martinez-Iglewicz	1.066609		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1977866		0.265	0.288	Can't reject normality
D'Agostino Skewness	0.4935361	0.6216338	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.6748	0.499815	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.6989	0.705073	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Selenium when Reach=Reference

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Percentile Section of Selenium when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	7.45			
95	7.45			
90	7.45			
85	7.0335			
80	6.498			
75	6.245			
70	6.218			
65	6.191	5.2	7.45	96.45647
60	6.164	5.2	7.45	97.46841
55	6.1215	5.2	7.45	97.35036
50	5.955	4.51	6.26	96.09375
45	5.7885	4.51	6.26	97.35036
40	5.582	4.51	6.26	97.46841
35	5.3705	4.51	6.26	96.45647
30	5.27			
25	5.225			
20	5.062			
15	4.7515			
10	4.51			
5	4.51			
1	4.51			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Selenium when Reach=Reference

Depth	Stem	Leaves
1	4.	5
3	5*	23
4	.	7
4	6*	122
1	.	
1	7*	4

Unit = .1 Example: 1 |2 Represents 1.2

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Summary Section of Selenium when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
0						

Counts Section of Selenium when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	0	12	0	0		0

Means Section of Selenium when Reach=Site

Parameter Value	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Std Error						
95% LCL						
95% UCL						
T-Value						
Prob Level						
Count	0					0

The geometric mean confidence interval assumes that the ln(y) are normally distributed.

The harmonic mean confidence interval assumes that the 1/y are normally distributed.

Variation Section of Selenium when Reach=Site

Parameter Value	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range

Skewness and Kurtosis Section of Selenium when Reach=Site

Parameter Value	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Std Error						

Quartile Section of Selenium when Reach=Site

Parameter Value	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
	0	0	0	0	0
95% LCL					
95% UCL					

Normality Test Section of Selenium when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz					
Kolmogorov-Smirnov					
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	
D'Agostino Omnibus			4.605	5.991	

Descriptive Statistics Report

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Percentile Section of Selenium when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99				
95				
90				
85				
80				
75				
70				
65				
60				
55				
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
1				

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Selenium when Reach=Site

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Selenium when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
0						

Counts Section of Selenium when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	0	2	0	0		0

Means Section of Selenium when Reach=Yacht Club

Parameter Value	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Std Error						
95% LCL						
95% UCL						
T-Value						
Prob Level						
Count	0					0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Variation Section of Selenium when Reach=Yacht Club

Parameter Value	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range

Skewness and Kurtosis Section of Selenium when Reach=Yacht Club

Parameter Value	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Std Error						

Quartile Section of Selenium when Reach=Yacht Club

Parameter Value	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
	0	0	0	0	0
95% LCL					
95% UCL					

Normality Test Section of Selenium when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz					
Kolmogorov-Smirnov					
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	
D'Agostino Omnibus			4.605	5.991	

Descriptive Statistics Report

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Percentile Section of Selenium when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99				
95				
90				
85				
80				
75				
70				
65				
60				
55				
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
1				

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Selenium when Reach=Yacht Club**Summary Section of Silver when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	1.957125	0.6402525	0.2263635	0.837	3	2.163

Counts Section of Silver when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	15.657	33.51217	2.869463

Means Section of Silver when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	1.957125	2.055	1.848488	1.719289	15.657	
Std Error	0.2263635				1.810908	
95% LCL	1.42186	0.837	1.340813	1.239768	11.37488	
95% UCL	2.492389	2.29	2.548385	2.803721	19.93912	
T-Value	8.645941					
Prob Level	5.533924E-05					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Descriptive Statistics Report

Dataset

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Variation Section of Silver when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.4099233	0.6402525	0.6634532	0.2263635	0.7575	2.163
Std Error	0.1925145	0.2126166		0.07517131		
95% LCL	0.1791985	0.4233184		0.1496657		
95% UCL	1.698038	1.303088		0.4607112		

Skewness and Kurtosis Section of Silver when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.2033375	2.764459	-0.2536064	0.9053642	0.3271393	0.2215937
Std Error	0.4133246	1.056648			0.08936509	

Quartile Section of Silver when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.837	1.52	2.055	2.2775	3
95% LCL			0.837		
95% UCL			2.29		

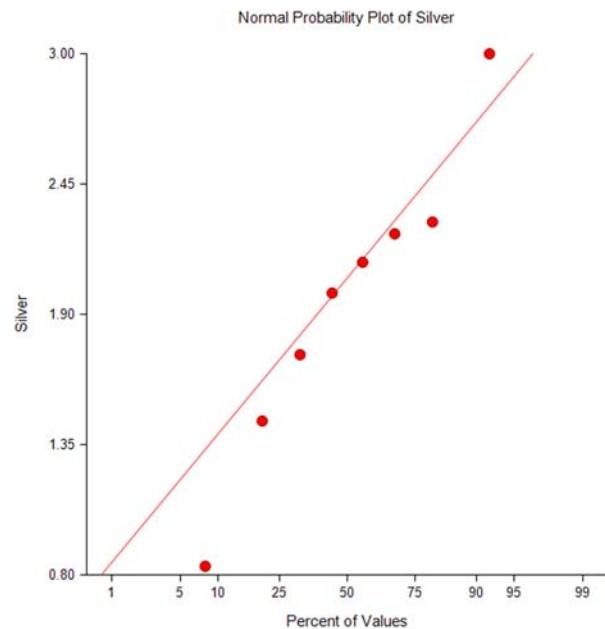
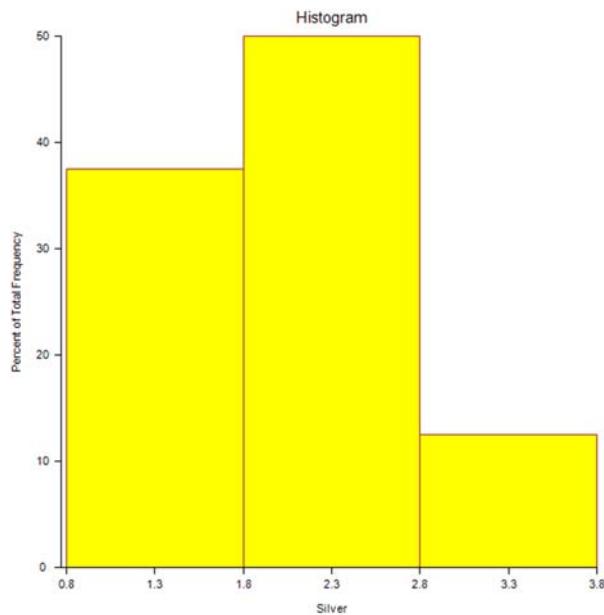
Normality Test Section of Silver when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9731931	0.921819			Can't reject normality
Anderson-Darling	0.2505016	0.743007			Can't reject normality
Martinez-Iglewicz	1.116259		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1765624		0.265	0.288	Can't reject normality
D'Agostino Skewness	-0.3425025	0.7319728	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	0.7505	0.452962	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.6805	0.711579	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Silver when Reach=Reference

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Silver when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	3			
95	3			
90	3			
85	2.7515			
80	2.432			
75	2.2775			
70	2.255			
65	2.222	1.45	3	96.45647
60	2.168	1.45	3	97.46841
55	2.1135	1.45	3	97.35036
50	2.055	0.837	2.29	96.09375
45	1.9965	0.837	2.29	97.35036
40	1.886	0.837	2.29	97.46841
35	1.769	0.837	2.29	96.45647
30	1.646			
25	1.52			
20	1.3274			
15	1.05155			
10	0.837			
5	0.837			
1	0.837			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Silver when Reach=Reference

Depth	Stem	Leaves
1	.	8
2	1*	4
4	.	79
4	2*	122
1	.	
1	3*	0

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Silver when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
11	2.562182	1.166301	0.351653	0.821	4.03	3.209
Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	11	1	11	28.184	85.81511	13.60258

Means Section of Silver when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	2.562182	2.78	2.249586	1.898586	28.184	
Std Error	0.351653				3.868182	
95% LCL	1.77865	0.913	1.522096	1.310495	19.56515	
95% UCL	3.345713	3.56	3.324781	3.444178	36.80285	
T-Value	7.286109					
Prob Level	2.643968E-05					
Count	11		11	11		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Silver when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	1.360258	1.166301	1.195777	0.351653	2.34	3.209
Std Error	0.3406331	0.2065196		0.062268		
95% LCL	0.6640853	0.8149143		0.2457059		
95% UCL	4.189311	2.046781		0.6171275		

Skewness and Kurtosis Section of Silver when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.3704641	1.689801	-0.4317179	-1.350331	0.4551983	0.3412688
Std Error	0.4867612	0.56625			0.09912325	

Quartile Section of Silver when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0.8394	1.22	2.78	3.56	3.984
95% LCL		0.821	0.913	2.54	
95% UCL		3.22	3.56	4.03	

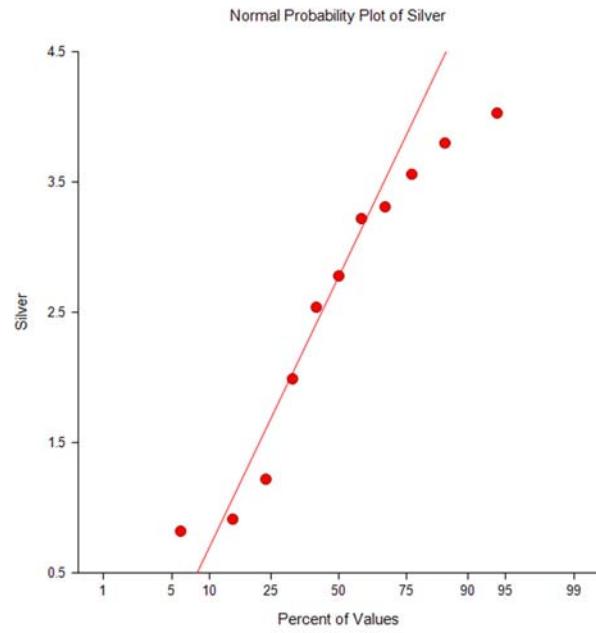
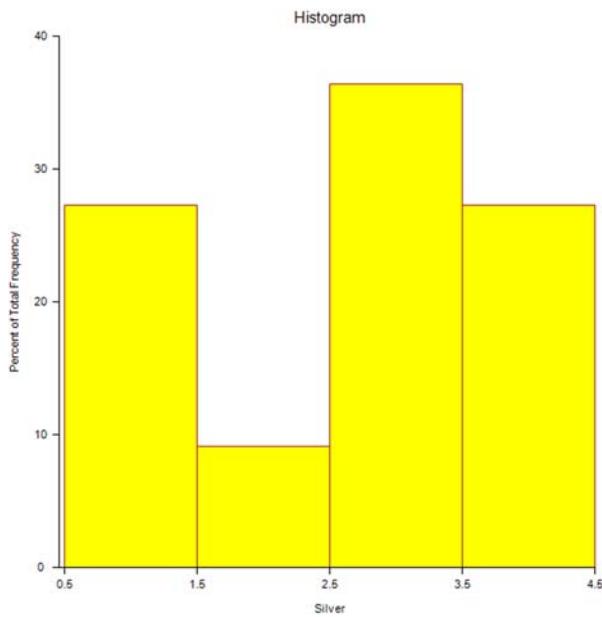
Normality Test Section of Silver when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9106829	0.2484736			Can't reject normality
Anderson-Darling	0.4192001	0.326749			Can't reject normality
Martinez-Iglewicz	0.9903874		1.390037	1.823783	Can't reject normality
Kolmogorov-Smirnov	0.1478205		0.231	0.251	Can't reject normality
D'Agostino Skewness	-0.677546	0.4980596	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.2816	0.199989	1.645	1.96	Can't reject normality
D'Agostino Omnibus	2.1015	0.349671	4.605	5.991	Can't reject normality

Descriptive Statistics Report

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Plots Section of Silver when Reach=Site

Descriptive Statistics Report

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Percentile Section of Silver when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	4.03			
95	4.03			
90	3.984			
85	3.846			
80	3.704			
75	3.56	2.54	4.03	95.02036
70	3.41	2.54	4.03	95.86076
65	3.292	1.99	4.03	97.90069
60	3.238	1.22	3.8	96.38425
55	3.044	1.22	3.8	97.12662
50	2.78	0.913	3.56	96.14258
45	2.636	0.913	3.56	97.12662
40	2.43	0.821	3.31	96.70905
35	2.1	0.821	3.31	97.90069
30	1.682	0.821	3.22	95.86076
25	1.22	0.821	3.22	95.02036
20	1.0358			
15	0.8946			
10	0.8394			
5	0.821			
1	0.821			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Silver when Reach=Site

Depth	Stem	Leaves
2	.	89
3	1*	2
4	.	9
4	2*	
(2)	.	57
5	3*	23
3	.	58
1	4*	0

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Silver when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
0						
Counts Section of Silver when Reach=Yacht Club						
Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	0	2	0	0		0

Means Section of Silver when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value					0	
Std Error						
95% LCL						
95% UCL						
T-Value						
Prob Level						
Count	0					0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Silver when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value						

Skewness and Kurtosis Section of Silver when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value						
Std Error						

Quartile Section of Silver when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	0	0	0	0	0
95% LCL					
95% UCL					

Normality Test Section of Silver when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz					
Kolmogorov-Smirnov					
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	
D'Agostino Omnibus			4.605	5.991	

Descriptive Statistics Report

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Percentile Section of Silver when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99				
95				
90				
85				
80				
75				
70				
65				
60				
55				
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
1				

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Silver when Reach=Yacht Club**Summary Section of Zinc when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	276.5	56.98621	20.14767	189	356	167

Counts Section of Zinc when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	2212	634350	22732

Means Section of Zinc when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	276.5	269	271.2709	265.985	2212	
Std Error	20.14767				161.1814	
95% LCL	228.8583	189	227.4477	225.3406	1830.867	
95% UCL	324.1417	349	323.5378	324.5177	2593.133	
T-Value	13.72367					
Prob Level	2.571329E-06					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Descriptive Statistics Report
Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Variation Section of Zinc when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	3247.428	56.98621	59.05121	20.14767	96.25	167
Std Error	1155.407	14.33674		5.068803		
95% LCL	1419.617	37.67781		13.32112		
95% UCL	13451.93	115.9825		41.00599		

Skewness and Kurtosis Section of Zinc when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.09680001	2.012701	0.1207308	-0.6733283	0.2060984	0.1682156
Std Error	0.460345	0.5919433			0.03798034	

Quartile Section of Zinc when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	189	239.25	269	335.5	356
95% LCL			189		
95% UCL			349		

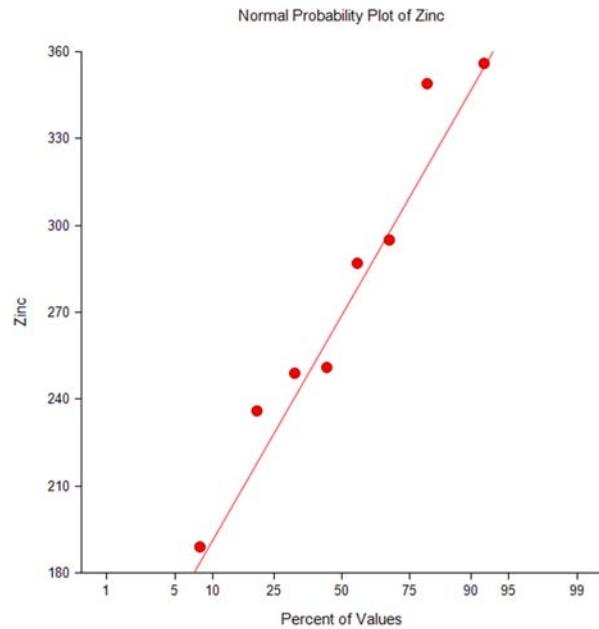
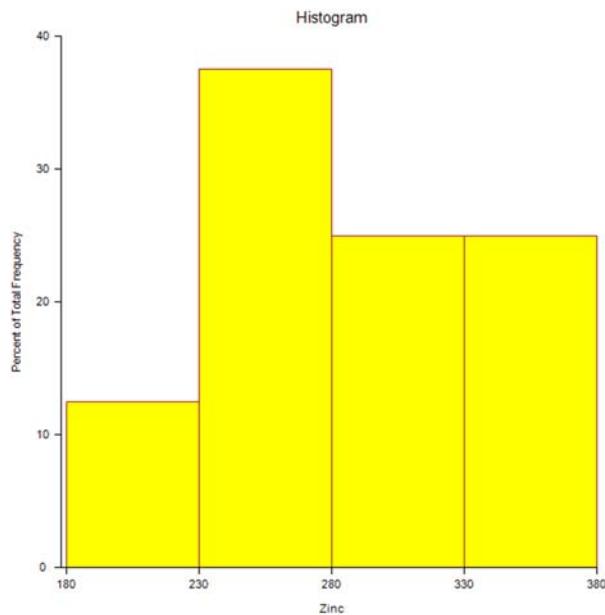
Normality Test Section of Zinc when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9489935	0.7010783			Can't reject normality
Anderson-Darling	0.2787747	0.64854			Can't reject normality
Martinez-Iglewicz	0.9692632		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1727345		0.265	0.288	Can't reject normality
D'Agostino Skewness	0.16313	0.870416	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-0.3460	0.729357	1.645	1.96	Can't reject normality
D'Agostino Omnibus	0.1463	0.929455	4.605	5.991	Can't reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Zinc when Reach=Reference

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Zinc when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	356			
95	356			
90	356			
85	353.55			
80	350.4			
75	335.5			
70	311.2			
65	293.8	236	356	96.45647
60	290.2	236	356	97.46841
55	285.2	236	356	97.35036
50	269	189	349	96.09375
45	252.8	189	349	97.35036
40	250.2	189	349	97.46841
35	249.3	189	349	96.45647
30	245.1			
25	239.25			
20	226.6			
15	205.45			
10	189			
5	189			
1	189			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Zinc when Reach=Reference

Depth	Stem	Leaves
1	1.	8
1	2*	
2	T	3
4	F	45
4	S	
4	.	89
2	3*	
2	T	
2	F	45

Unit = 10 Example: 1 | 2 Represents 120

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Zinc when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	313.875	24.48016	7.066814	265	341	76
Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	12	3766.5	1188802	6592.063

Means Section of Zinc when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	313.875	319.5	312.9691	312.0327	3766.5	
Std Error	7.066814				84.80177	
95% LCL	298.321	290	297.4303	296.5231	3579.853	
95% UCL	329.429	337	329.3196	329.2543	3953.147	
T-Value	44.41534					
Prob Level	9.214851E-14					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.

The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

Variation Section of Zinc when Reach=Site

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	599.2784	24.48016	25.04213	7.066814	45.5	76
Std Error	190.6377	5.506548		1.589604		
95% LCL	300.7321	17.34163		5.006097		
95% UCL	1727.594	41.56433		11.99859		

Skewness and Kurtosis Section of Zinc when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.6018289	2.214344	-0.6914488	-0.5149876	0.07799336	0.0624674
Std Error	0.4660007	0.7035879			0.01339773	

Quartile Section of Zinc when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	272.05	291.25	319.5	336.75	340.1
95% LCL		265	290	315	
95% UCL		324	337	341	

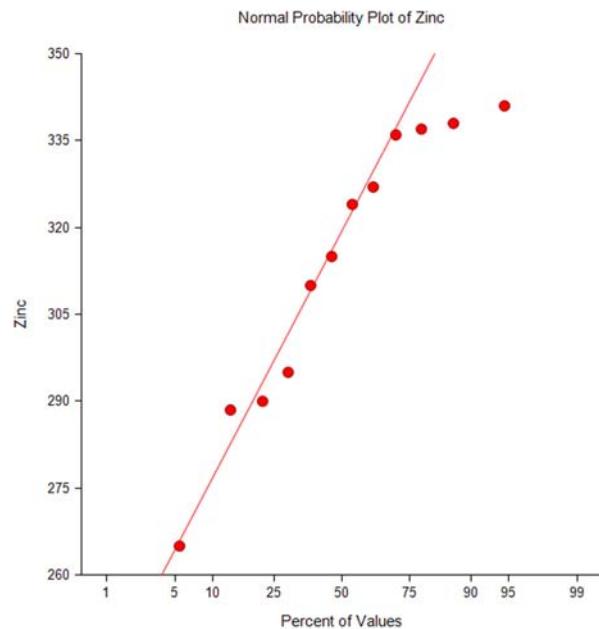
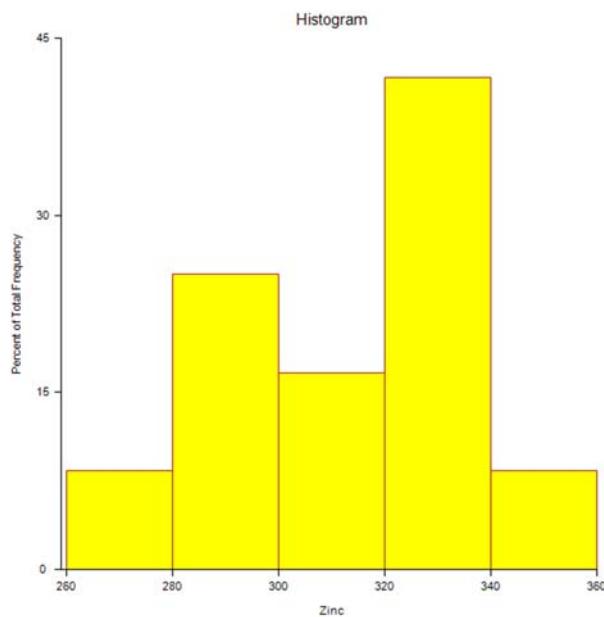
Normality Test Section of Zinc when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.909924	0.2128695			Can't reject normality
Anderson-Darling	0.4633164	0.2563877			Can't reject normality
Martinez-Iglewicz	1.062955		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.1339223		0.222	0.242	Can't reject normality
D'Agostino Skewness	-1.115945	0.2644458	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-0.2821	0.777853	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.3249	0.515581	4.605	5.991	Can't reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Zinc when Reach=Site

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Zinc when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	341			
95	341			
90	340.1			
85	338.15			
80	337.4			
75	336.75	315	341	95.40709
70	336.1	310	341	97.66693
65	331.05	295	338	95.19489
60	326.4	295	338	96.51417
55	324.45	295	338	95.6136
50	319.5	290	337	96.14258
45	314.25	288.5	336	95.6136
40	311	288.5	336	96.51417
35	303.25	265	327	96.88046
30	294.5	265	327	97.66693
25	291.25	265	324	95.40709
20	289.4			
15	287.325			
10	272.05			
5	265			
1	265			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Zinc when Reach=Site

Depth	Stem	Leaves
1	26	5
1	27	
2	28	8
4	29	05
4	30	
6	31	05
6	32	47
4	33	678
1	34	1

Unit = 1 Example: 1 |2 Represents 12

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Summary Section of Zinc when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	375.75	148.1389	104.75	271	480.5	209.5

Counts Section of Zinc when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	751.5	304321.3	21945.13

Means Section of Zinc when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	375.75	375.75	360.8539	346.5482	751.5	
Std Error	104.75				209.5	
95% LCL	-955.225		9.487716	76.29554	-1910.45	
95% UCL	1706.725		13724.64	-136.3192	3413.45	
T-Value	3.587112					
Prob Level	0.1730798					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Zinc when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	21945.13	148.1389	185.6645	104.75	209.5	209.5
Std Error	0	0		0		
95% LCL	4368.157	66.09203		46.73413		
95% UCL	2.23458E+07	4727.135		3342.589		

Skewness and Kurtosis Section of Zinc when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.3942485	0.2787758
Std Error					0.07771593	

Quartile Section of Zinc when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	271	271	375.75	480.5	480.5
95% LCL					
95% UCL					

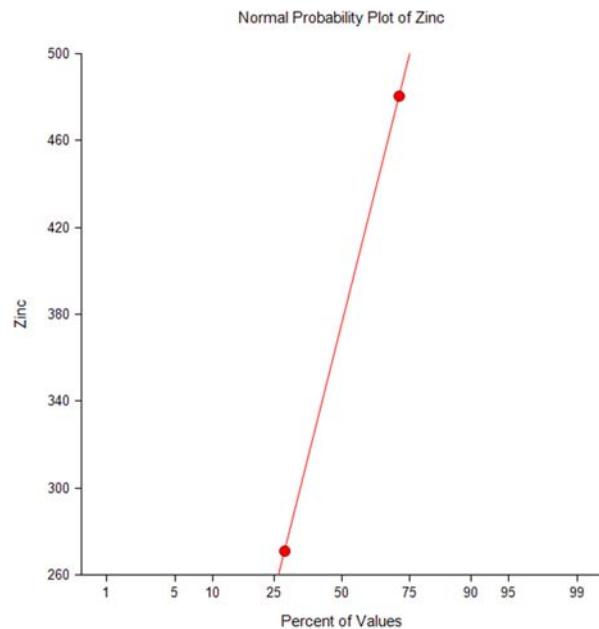
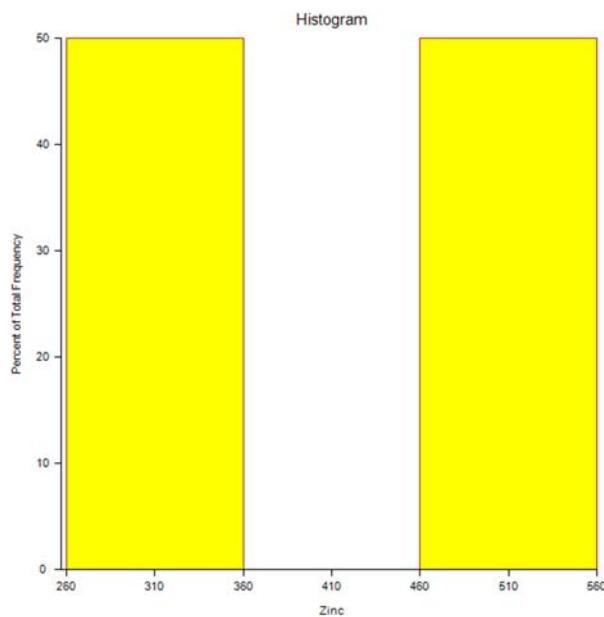
Normality Test Section of Zinc when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of Zinc when Reach=Yacht Club

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Percentile Section of Zinc when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	480.5			
95	480.5			
90	480.5			
85	480.5			
80	480.5			
75	480.5			
70	480.5			
65	470.025			
60	438.6			
55	407.175			
50	375.75			
45	344.325			
40	312.9			
35	281.475			
30	271			
25	271			
20	271			
15	271			
10	271			
5	271			
1	271			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Zinc when Reach=Yacht Club**Summary Section of TOC when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	4.20625	0.8484597	0.2999758	3.16	5.4	2.24

Counts Section of TOC when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	8	33.65	146.5795	5.039187

Means Section of TOC when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	4.20625	4.28	4.129945	4.05357	33.65	
Std Error	0.2999758				2.399806	
95% LCL	3.49692	3.16	3.476485	3.45409	27.97536	
95% UCL	4.91558	5.04	4.906233	4.904837	39.32464	
T-Value	14.02196					
Prob Level	2.222436E-06					
Count	8		8	8		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of TOC when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.7198839	0.8484597	0.8792052	0.2999758	1.6825	2.24
Std Error	0.1935214	0.1612808		0.05702137		
95% LCL	0.3146982	0.5609797		0.1983363		
95% UCL	2.981999	1.726846		0.6105324		

Skewness and Kurtosis Section of TOC when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.00229691	1.578126	0.00286475	-1.585935	0.2017141	0.1620911
Std Error	0.5407954	0.3275102			0.03023194	

Quartile Section of TOC when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	3.16	3.29	4.28	4.9725	5.4
95% LCL			3.16		
95% UCL			5.04		

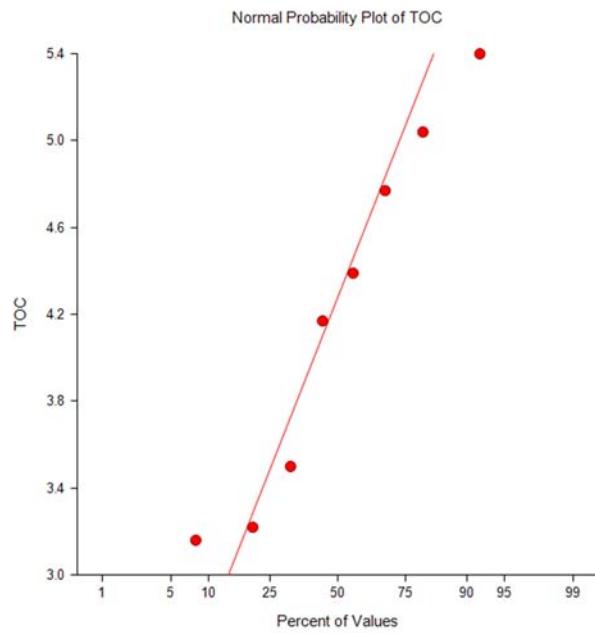
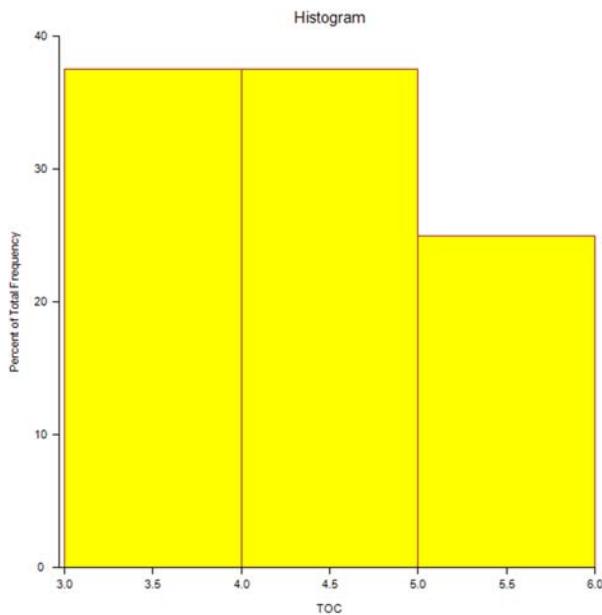
Normality Test Section of TOC when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9308625	0.5239586			Can't reject normality
Anderson-Darling	0.2879645	0.6188427			Can't reject normality
Martinez-Iglewicz	1.058158		1.548495	2.421191	Can't reject normality
Kolmogorov-Smirnov	0.1724058		0.265	0.288	Can't reject normality
D'Agostino Skewness	0.00387137	0.9969111	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.2263	0.220084	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.5038	0.471461	4.605	5.991	Can't reject normality

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Plots Section of TOC when Reach=Reference

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Percentile Section of TOC when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	5.4			
95	5.4			
90	5.4			
85	5.274			
80	5.112			
75	4.9725			
70	4.851			
65	4.713	3.22	5.4	96.45647
60	4.542	3.22	5.4	97.46841
55	4.379	3.22	5.4	97.35036
50	4.28	3.16	5.04	96.09375
45	4.181	3.16	5.04	97.35036
40	3.902	3.16	5.04	97.46841
35	3.6005	3.16	5.04	96.45647
30	3.416			
25	3.29			
20	3.208			
15	3.181			
10	3.16			
5	3.16			
1	3.16			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of TOC when Reach=Reference

Depth	Stem	Leaves
2	3*	12
3	.	5
(2)	4*	13
3	.	7
2	5*	04

Unit = .1 Example: 1 |2 Represents 1.2

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Summary Section of TOC when Reach=Site

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
12	3.965	1.270437	0.3667434	2.06	5.85	3.79

Counts Section of TOC when Reach=Site

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	12	0	11	47.58	206.4088	17.7541

Means Section of TOC when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	3.965	4.3	3.74963	3.513908	47.58	4.93
Std Error	0.3667434				4.400921	
95% LCL	3.157803	2.43	2.97373	2.802045	37.89364	
95% UCL	4.772197	4.93	4.727976	4.710657	57.26636	
T-Value	10.81137					
Prob Level	3.372541E-07					
Count	12		12	12		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of TOC when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	1.614009	1.270437	1.2996	0.3667434	2.335	3.79
Std Error	0.4279442	0.2381876		0.06875883		
95% LCL	0.809948	0.8999711		0.2597993		
95% UCL	4.652849	2.157046		0.6226856		

Skewness and Kurtosis Section of TOC when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	-0.3542915	1.843613	-0.40705	-1.104036	0.3204128	0.2379845
Std Error	0.460243	0.5961353			0.05949239	

Quartile Section of TOC when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	2.063	2.595	4.3	4.93	5.622
95% LCL		2.06	2.43	4.06	
95% UCL		4.54	4.93	5.85	

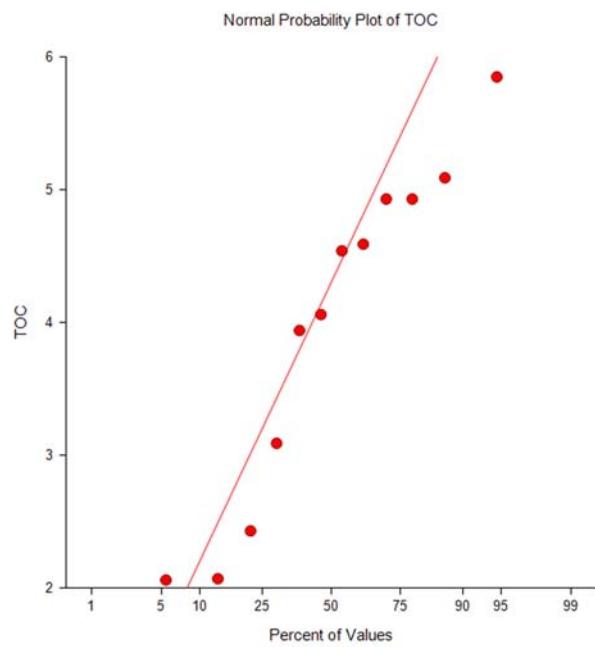
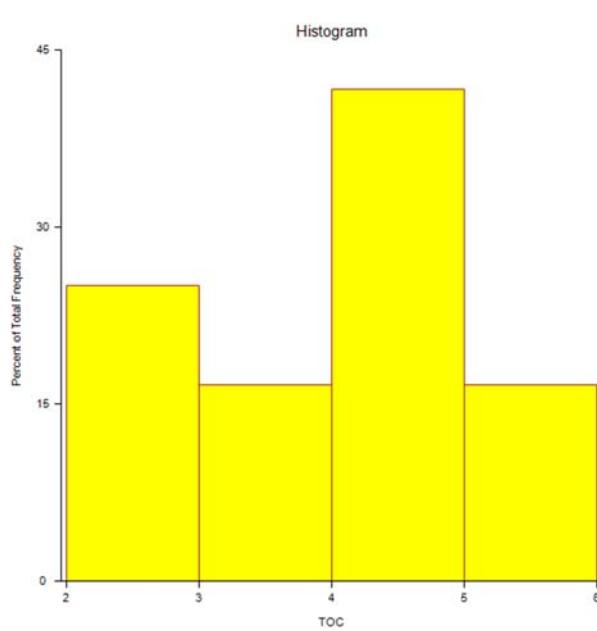
Normality Test Section of TOC when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.9158849	0.2536339			Can't reject normality
Anderson-Darling	0.478534	0.2355199			Can't reject normality
Martinez-Iglewicz	0.9698945		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.1365237		0.222	0.242	Can't reject normality
D'Agostino Skewness	-0.6651771	0.5059372	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-1.0055	0.314652	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.4535	0.483476	4.605	5.991	Can't reject normality

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Plots Section of TOC when Reach=Site

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Percentile Section of TOC when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	5.85			
95	5.85			
90	5.622			
85	5.128			
80	4.994			
75	4.93	4.06	5.85	95.40709
70	4.93	3.94	5.85	97.66693
65	4.743	3.09	5.09	95.19489
60	4.58	3.09	5.09	96.51417
55	4.5475	3.09	5.09	95.6136
50	4.3	2.43	4.93	96.14258
45	4.042	2.07	4.93	95.6136
40	3.964	2.07	4.93	96.51417
35	3.5575	2.06	4.59	96.88046
30	3.024	2.06	4.59	97.66693
25	2.595	2.06	4.54	95.40709
20	2.286			
15	2.0695			
10	2.063			
5	2.06			
1	2.06			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of TOC when Reach=Site

Depth	Stem	Leaves
3	2*	004
3	.	
4	3*	0
5	.	9
6	4*	0
6	.	5599
2	5*	0
1	.	8

Unit = .1 Example: 1 |2 Represents 1.2

Descriptive Statistics Report

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Summary Section of TOC when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	4.405	0.7424621	0.525	3.88	4.93	1.05

Counts Section of TOC when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	8.81	39.3593	0.55125

Means Section of TOC when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	4.405	4.405	4.373603	4.342429	8.81	
Std Error	0.525				1.05	
95% LCL	-2.265758		0.9550369	1.727051	-4.531515	
95% UCL	11.07576		20.02896	-8.442387	22.15151	
T-Value	8.390476					
Prob Level	0.07551787					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of TOC when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	0.55125	0.7424621	0.9305383	0.525	1.05	1.05
Std Error	5.268356E-09	5.017482E-09		3.547896E-09		
95% LCL	0.1097258	0.3312489		0.2342283		
95% UCL	561.3149	23.69209		16.75283		

Skewness and Kurtosis Section of TOC when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.1685499	0.1191828
Std Error					0.01420453	

Quartile Section of TOC when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	3.88	3.88	4.405	4.93	4.93
95% LCL					
95% UCL					

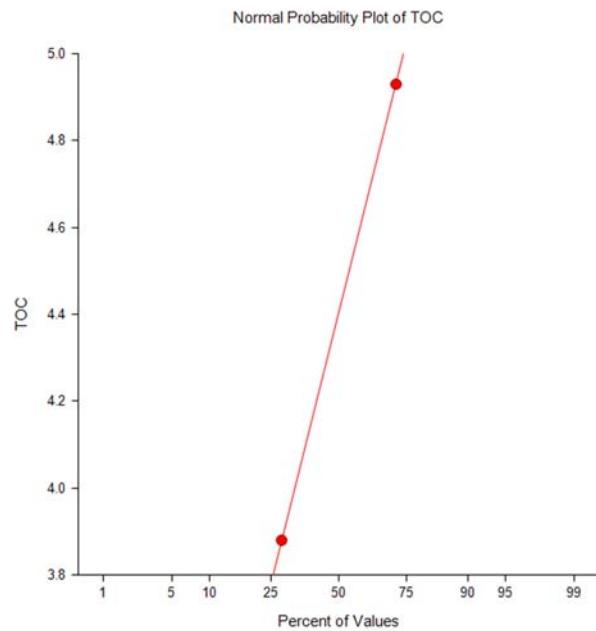
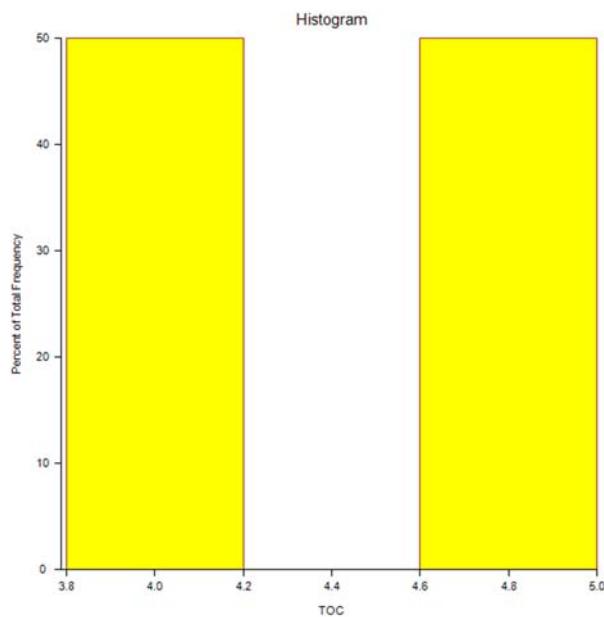
Normality Test Section of TOC when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

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Plots Section of TOC when Reach=Yacht Club

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Percentile Section of TOC when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	4.93			
95	4.93			
90	4.93			
85	4.93			
80	4.93			
75	4.93			
70	4.93			
65	4.8775			
60	4.72			
55	4.5625			
50	4.405			
45	4.2475			
40	4.09			
35	3.9325			
30	3.88			
25	3.88			
20	3.88			
15	3.88			
10	3.88			
5	3.88			
1	3.88			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of TOC when Reach=Yacht Club**Summary Section of Percent_Solid when Reach=Reference**

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
8	46.1125	6.306105	2.229545	40.2	60.6	20.4

Counts Section of Percent_Solid when Reach=Reference

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	8	0	7	368.9	17289.27	278.3687

Means Section of Percent_Solid when Reach=Reference

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	46.1125	44.55	45.77821	45.48236	368.9	42.5
Std Error	2.229545				17.83636	
95% LCL	40.84047	40.2	41.22521	41.49009	326.7237	
95% UCL	51.38454	47.6	50.83405	50.32471	411.0763	
T-Value	20.68247					
Prob Level	1.551041E-07					
Count	8		8	8		2

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.

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Variation Section of Percent_Solid when Reach=Reference

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	39.76696	6.306105	6.534618	2.229545	4.8	20.4
Std Error	27.08632	3.037203		1.073813		
95% LCL	17.38418	4.169434		1.474118		
95% UCL	164.728	12.83464		4.537731		

Skewness and Kurtosis Section of Percent_Solid when Reach=Reference

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	1.665183	4.711464	2.076849	4.994074	0.1367548	0.08445567
Std Error	0.9288698	4.31089			0.04134475	

Quartile Section of Percent_Solid when Reach=Reference

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	40.2	42.5	44.55	47.3	60.6
95% LCL			40.2		
95% UCL			47.6		

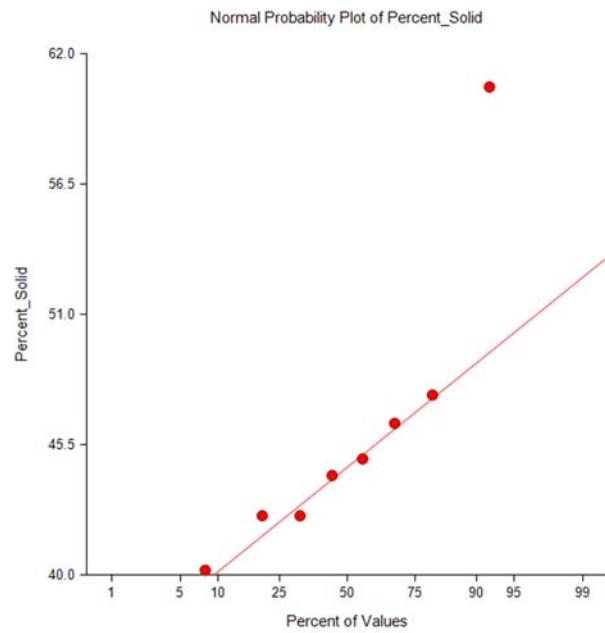
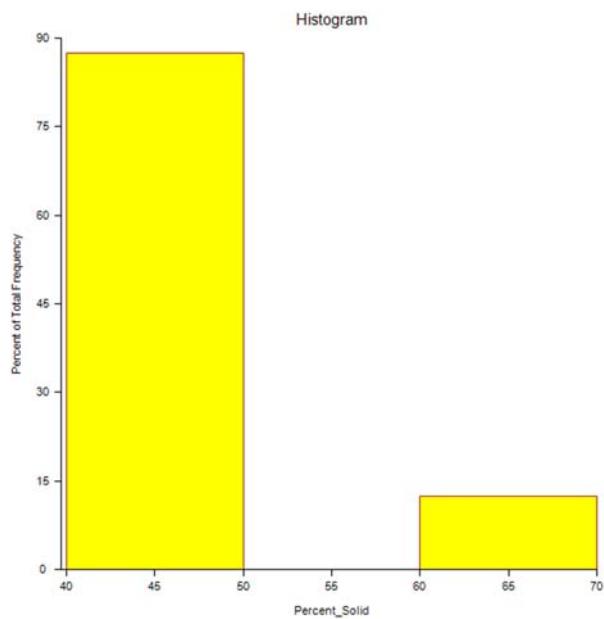
Normality Test Section of Percent_Solid when Reach=Reference

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.7740406	0.01500303			Reject normality
Anderson-Darling	0.9062597	0.02096586			Reject normality
Martinez-Iglewicz	4.714913		1.548495	2.421191	Reject normality
Kolmogorov-Smirnov	0.2817619		0.265	0.288	Can't reject normality
D'Agostino Skewness	2.699426	0.00694591	1.645	1.96	Reject normality
D'Agostino Kurtosis	2.4347	0.014904	1.645	1.96	Reject normality
D'Agostino Omnibus	13.2147	0.001350	4.605	5.991	Reject normality

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Plots Section of Percent_Solid when Reach=Reference

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Percentile Section of Percent_Solid when Reach=Reference

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	60.6			
95	60.6			
90	60.6			
85	56.05			
80	50.2			
75	47.3			
70	46.76			
65	46.175	42.5	60.6	96.45647
60	45.5	42.5	60.6	97.46841
55	44.865	42.5	60.6	97.35036
50	44.55	40.2	47.6	96.09375
45	44.235	40.2	47.6	97.35036
40	43.52	40.2	47.6	97.46841
35	42.755	40.2	47.6	96.45647
30	42.5			
25	42.5			
20	42.04			
15	41.005			
10	40.2			
5	40.2			
1	40.2			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Percent_Solid when Reach=Reference

Depth	Stem	Leaves
1	40	2
1	41	
3	42	55
3	43	
(2)	44	29
3	45	
3	46	4
2	47	6
High		606

Unit = .1 Example: 1 |2 Represents 1.2

Summary Section of Percent_Solid when Reach=Site

Count	Mean	Standard	Standard	Minimum	Maximum	Range
		Deviation	Error			
12	54.49583	8.524949	2.460941	44.4	69	24.6

Counts Section of Percent_Solid when Reach=Site

Rows	Sum of	Missing	Distinct	Sum	Total	Adjusted
	Frequencies	Values	Values		Sum Squares	Sum Squares
22	12	0	10	653.95	36436.97	799.4223

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Means Section of Percent_Solid when Reach=Site

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	54.49583	51.15	53.91435	53.36606	653.95	
Std Error	2.460941				29.53129	
95% LCL	49.07934	48.2	48.97211	48.84939	588.9521	
95% UCL	59.91233	62.85	59.35536	58.80306	718.9479	
T-Value	22.14431					
Prob Level	1.787492E-10					
Count	12		12	12		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Percent_Solid when Reach=Site**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	72.67475	8.524949	8.720646	2.460941	13.2875	24.6
Std Error	21.19348	1.757905		0.5074635		
95% LCL	36.46991	6.039032		1.743319		
95% UCL	209.506	14.47432		4.178377		

Skewness and Kurtosis Section of Percent_Solid when Reach=Site

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value	0.6371611	2.020513	0.7320424	-0.8229624	0.156433	0.1361193
Std Error	0.4880107	0.8285583			0.01927212	

Quartile Section of Percent_Solid when Reach=Site

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	45.24	48.2	51.15	61.4875	68.88
95% LCL		44.4	48.2	48.6	
95% UCL		53.7	62.85	69	

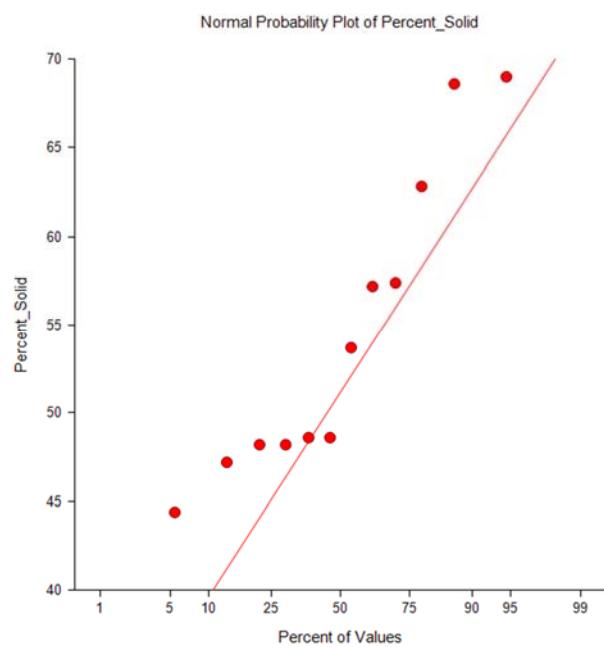
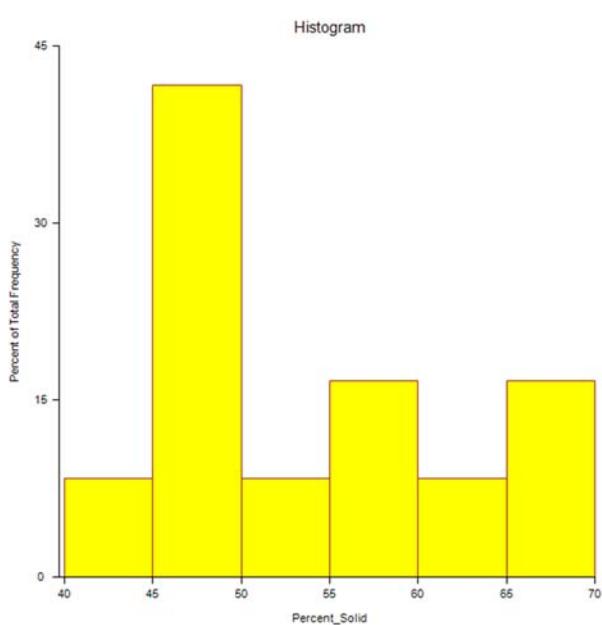
Normality Test Section of Percent_Solid when Reach=Site

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W	0.8738914	0.07323198			Can't reject normality
Anderson-Darling	0.699402	0.06787498			Can't reject normality
Martinez-Iglewicz	1.089309		1.356672	1.719144	Can't reject normality
Kolmogorov-Smirnov	0.2554049		0.222	0.242	Reject normality
D'Agostino Skewness	1.178826	0.2384673	1.645	1.96	Can't reject normality
D'Agostino Kurtosis	-0.6350	0.525430	1.645	1.96	Can't reject normality
D'Agostino Omnibus	1.7929	0.408025	4.605	5.991	Can't reject normality

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Plots Section of Percent_Solid when Reach=Site

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Percentile Section of Percent_Solid when Reach=Site

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	69			
95	69			
90	68.88			
85	68.62			
80	65.15			
75	61.4875	48.6	69	95.40709
70	57.945	48.6	69	97.66693
65	57.29	48.2	68.6	95.19489
60	56.5	48.2	68.6	96.51417
55	54.225	48.2	68.6	95.6136
50	51.15	48.2	62.85	96.14258
45	48.6	47.2	57.4	95.6136
40	48.6	47.2	57.4	96.51417
35	48.42	44.4	57.2	96.88046
30	48.2	44.4	57.2	97.66693
25	48.2	44.4	53.7	95.40709
20	47.8			
15	47.06			
10	45.24			
5	44.4			
1	44.4			

Percentile Formula: Ave X(p[n+1])

Stem-Leaf Plot Section of Percent_Solid when Reach=Site

Depth	Stem	Leaves
1	4*	4
6	.	788888
6	5*	3
5	.	77
3	6*	2
2	.	89

Unit = 1 Example: 1 |2 Represents 12

Summary Section of Percent_Solid when Reach=Yacht Club

Count	Mean	Standard Deviation	Standard Error	Minimum	Maximum	Range
2	54.225	16.29881	11.525	42.7	65.75	23.05

Counts Section of Percent_Solid when Reach=Yacht Club

Rows	Sum of Frequencies	Missing Values	Distinct Values	Sum	Total Sum Squares	Adjusted Sum Squares
22	2	0	2	108.45	6146.353	265.6512

Descriptive Statistics Report

Dataset

...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Means Section of Percent_Solid when Reach=Yacht Club

Parameter	Mean	Median	Geometric Mean	Harmonic Mean	Sum	Mode
Value	54.225	54.225	52.98608	51.77547	108.45	
Std Error	11.525				23.05	
95% LCL	-92.21401		3.41318	13.99117	-184.428	
95% UCL	200.664		822.5541	-30.44575	401.328	
T-Value	4.704989					
Prob Level	0.1333235					
Count	2		2	2		0

The geometric mean confidence interval assumes that the $\ln(y)$ are normally distributed.The harmonic mean confidence interval assumes that the $1/y$ are normally distributed.**Variation Section of Percent_Solid when Reach=Yacht Club**

Parameter	Variance	Standard Deviation	Unbiased Std Dev	Std Error of Mean	Interquartile Range	Range
Value	265.6512	16.29881	20.42753	11.525	23.05	23.05
Std Error	0	0		0		
95% LCL	52.87764	7.271701		5.14187		
95% UCL	270501.6	520.0977		367.7646		

Skewness and Kurtosis Section of Percent_Solid when Reach=Yacht Club

Parameter	Skewness	Kurtosis	Fisher's g1	Fisher's g2	Coefficient of Variation	Coefficient of Dispersion
Value					0.3005774	
Std Error					0.0451734	0.2125403

Quartile Section of Percent_Solid when Reach=Yacht Club

Parameter	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Value	42.7	42.7	54.225	65.75	65.75
95% LCL					
95% UCL					

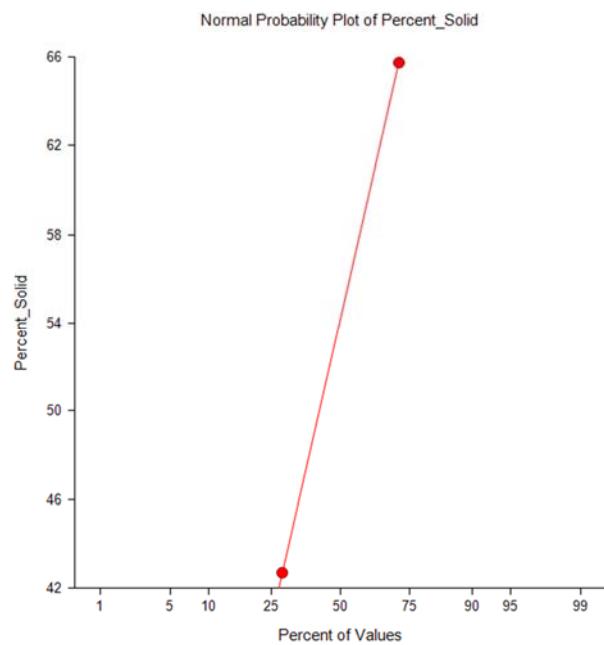
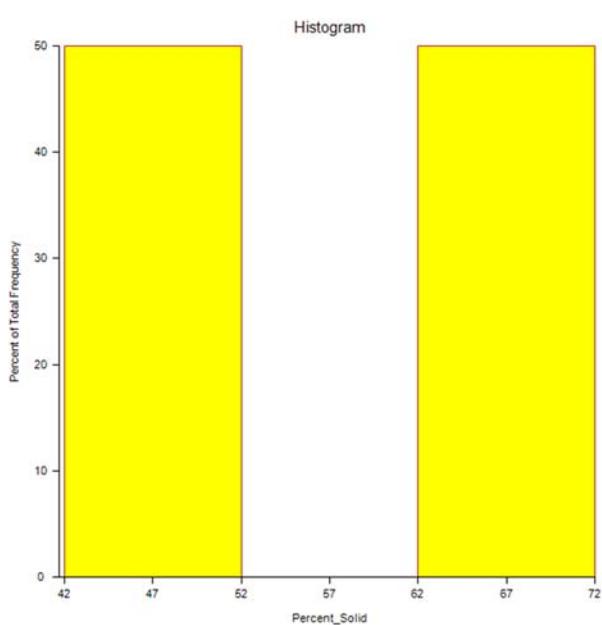
Normality Test Section of Percent_Solid when Reach=Yacht Club

Test Name	Test Value	Prob Level	10% Critical Value	5% Critical Value	Decision (5%)
Shapiro-Wilk W					
Anderson-Darling					
Martinez-Iglewicz	1.805		5.323102	81.61262	Can't reject normality
Kolmogorov-Smirnov	0.2602499		0.437	0.472	Can't reject normality
D'Agostino Skewness	0		1.645	1.96	
D'Agostino Kurtosis		1.000000	1.645	1.96	Can't reject normality
D'Agostino Omnibus			4.605	5.991	Reject normality

Descriptive Statistics Report

Dataset

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Plots Section of Percent_Solid when Reach=Yacht Club

Descriptive Statistics Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Percentile Section of Percent_Solid when Reach=Yacht Club

Percentile	Value	95% LCL	95% UCL	Exact Conf. Level
99	65.75			
95	65.75			
90	65.75			
85	65.75			
80	65.75			
75	65.75			
70	65.75			
65	64.5975			
60	61.14			
55	57.6825			
50	54.225			
45	50.7675			
40	47.31			
35	43.8525			
30	42.7			
25	42.7			
20	42.7			
15	42.7			
10	42.7			
5	42.7			
1	42.7			

Percentile Formula: Ave X(p[n+1])

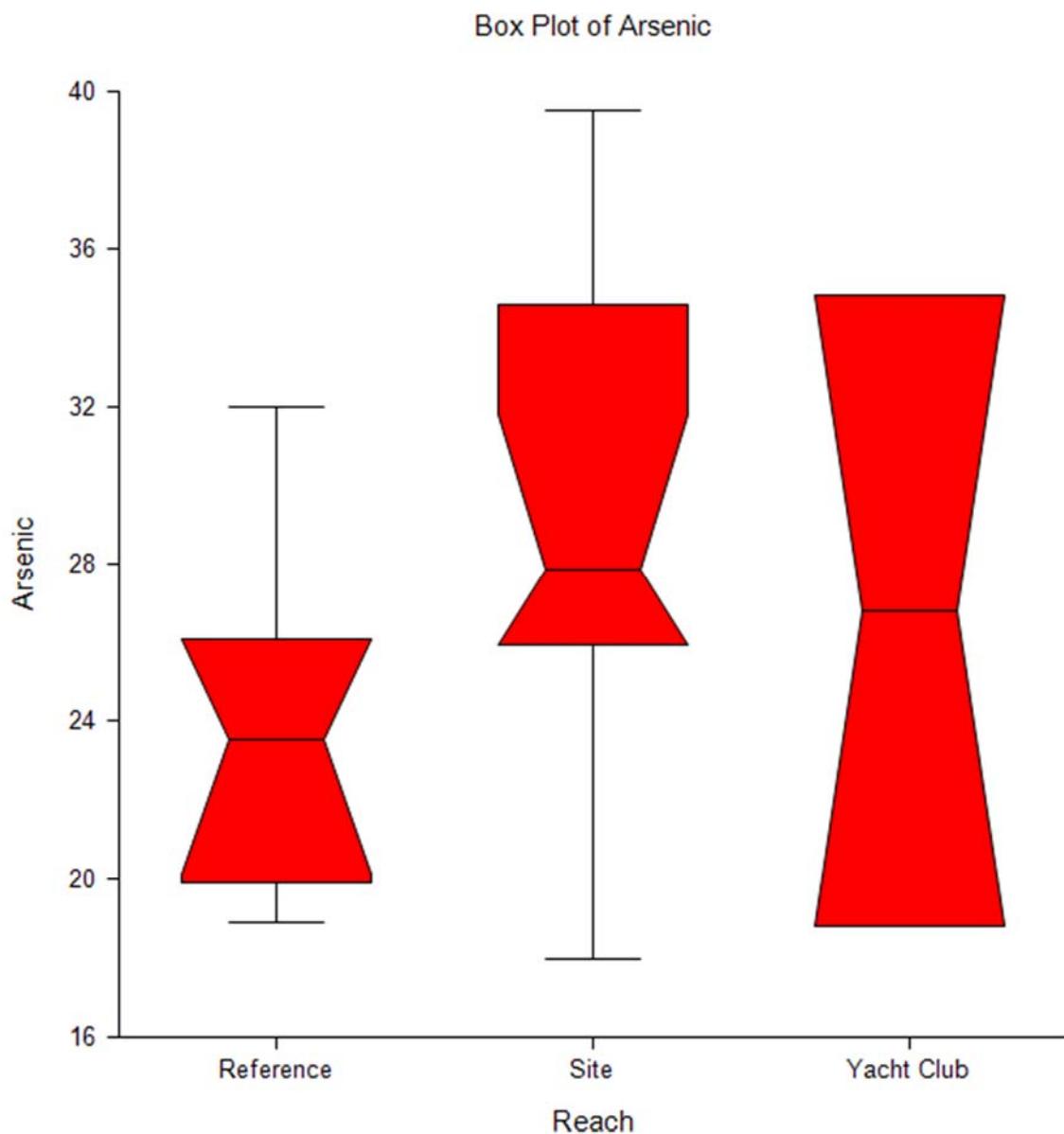
Stem-Leaf Plot Section of Percent_Solid when Reach=Yacht Club

APPENDIX D-2

Box Plots for Metals in Sediment

Dataset

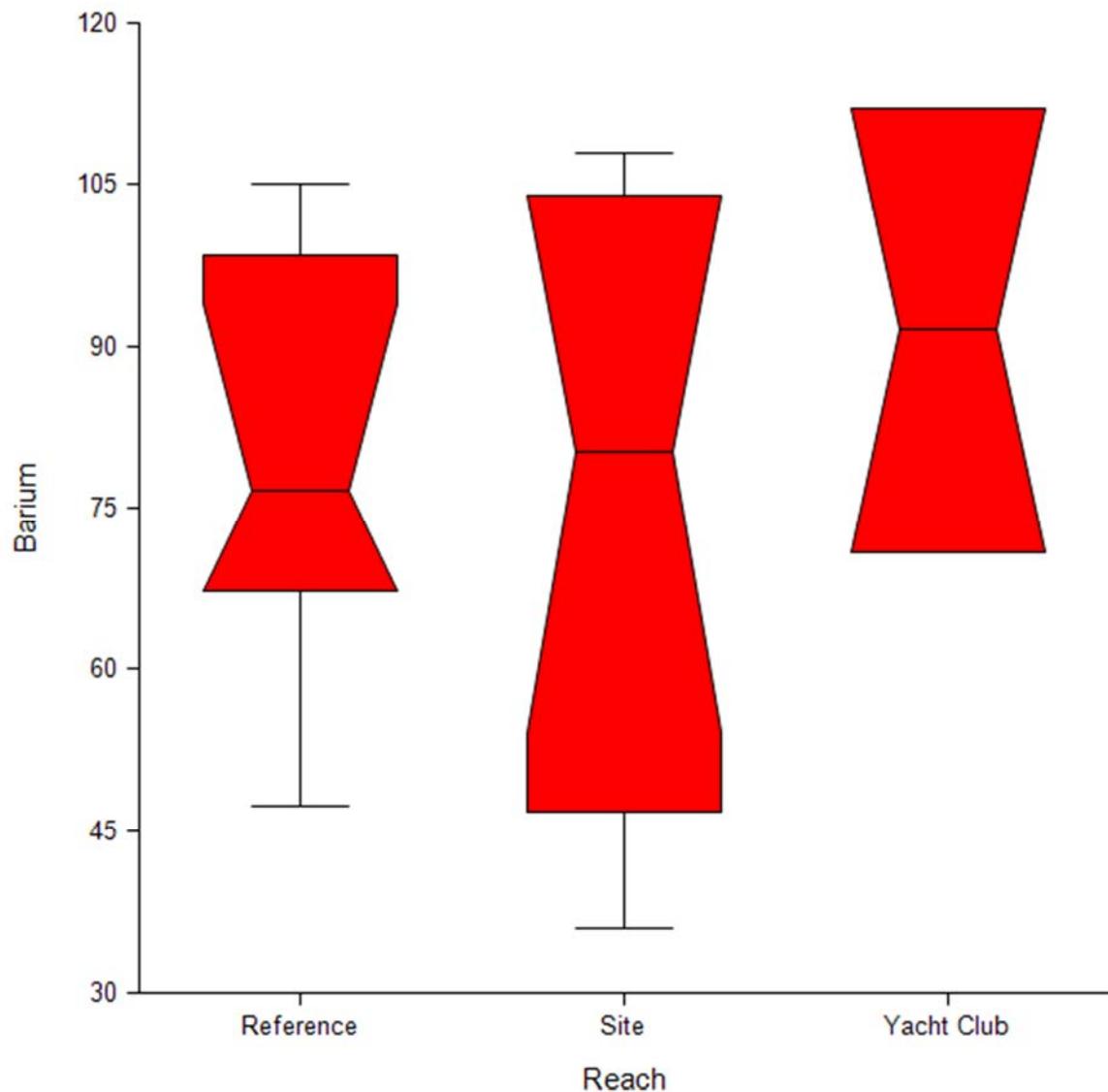
Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Box Plots

Dataset

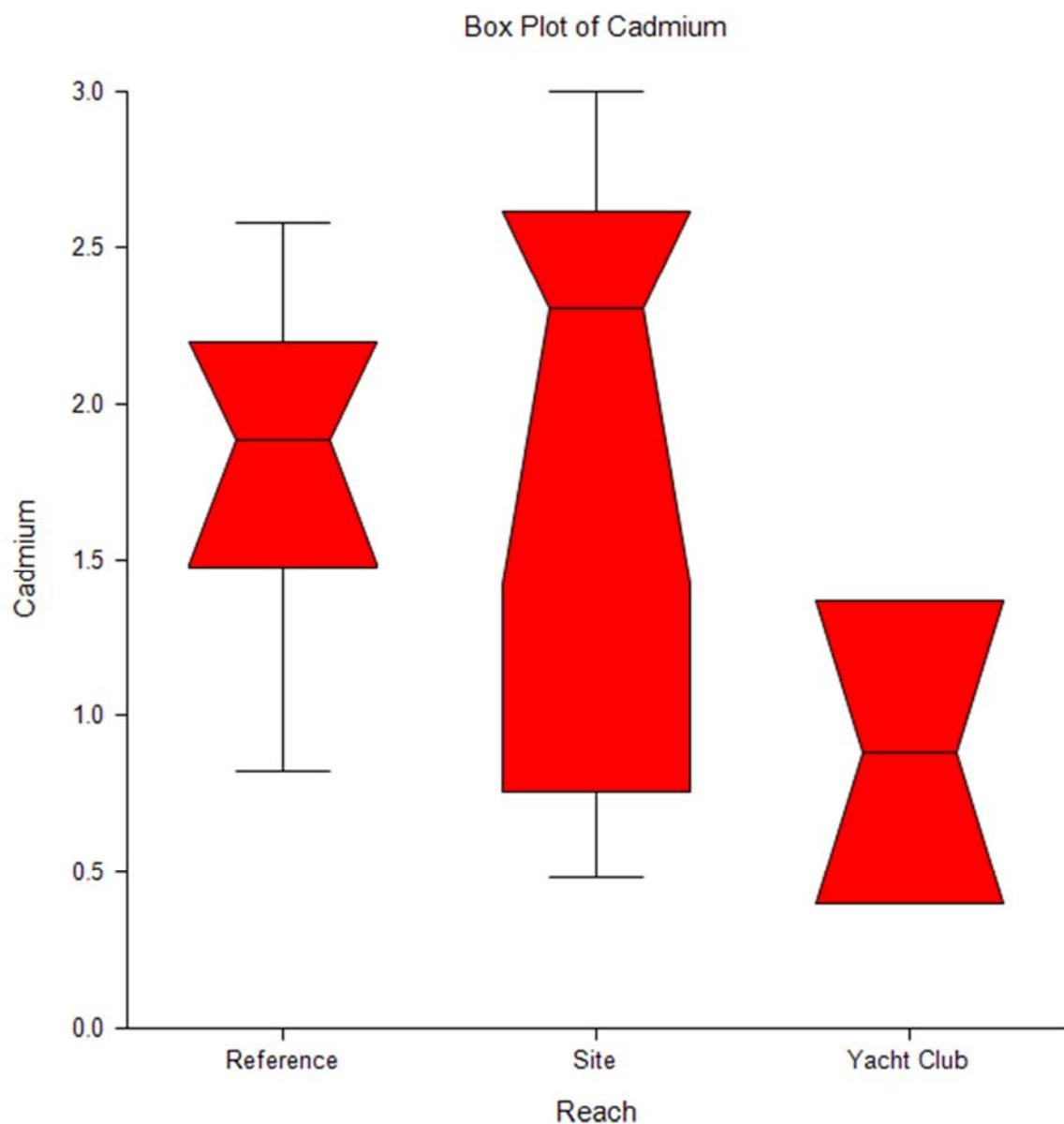
Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Box Plot of Barium



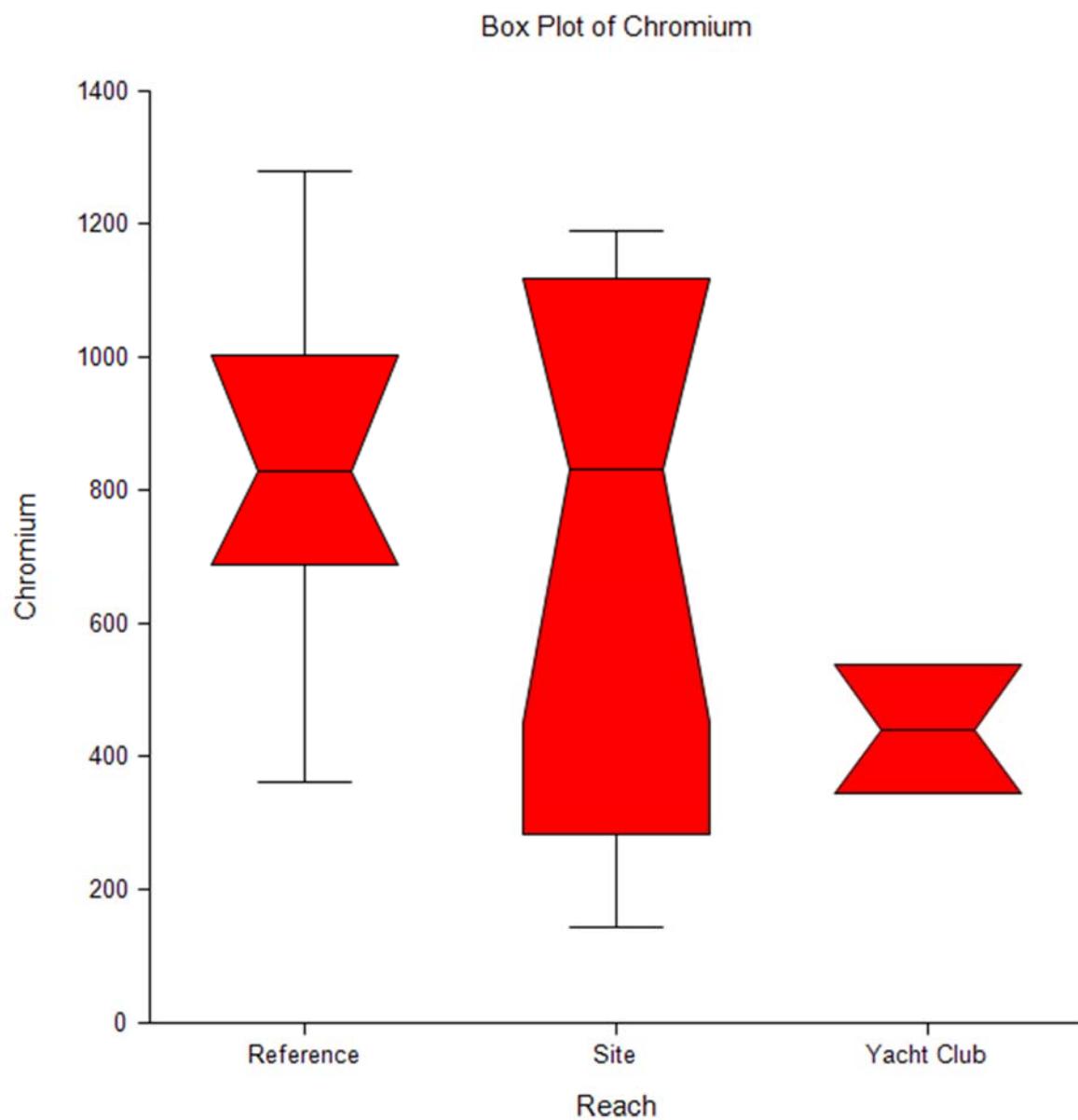
Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS



Dataset

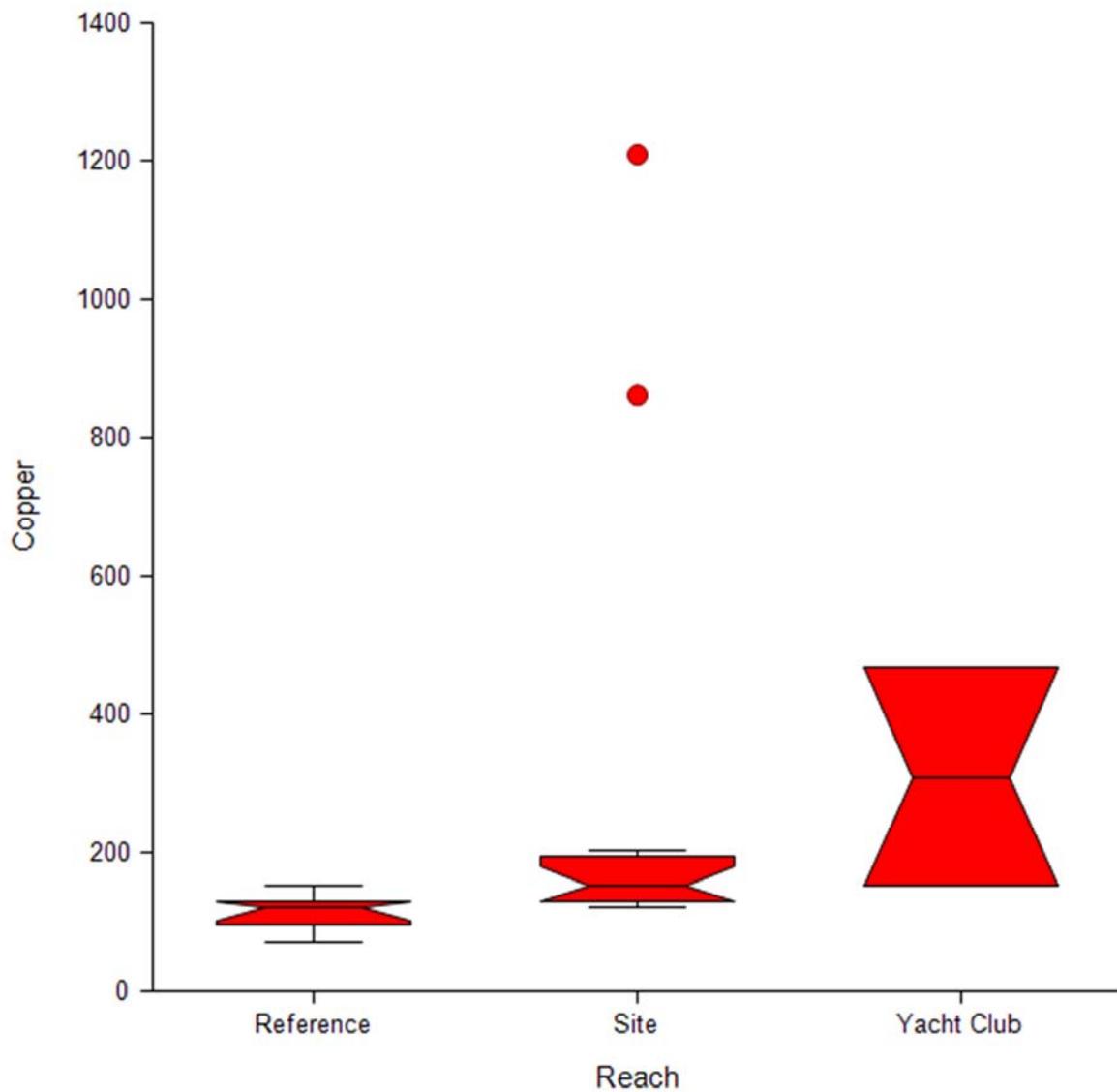
Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS



Dataset

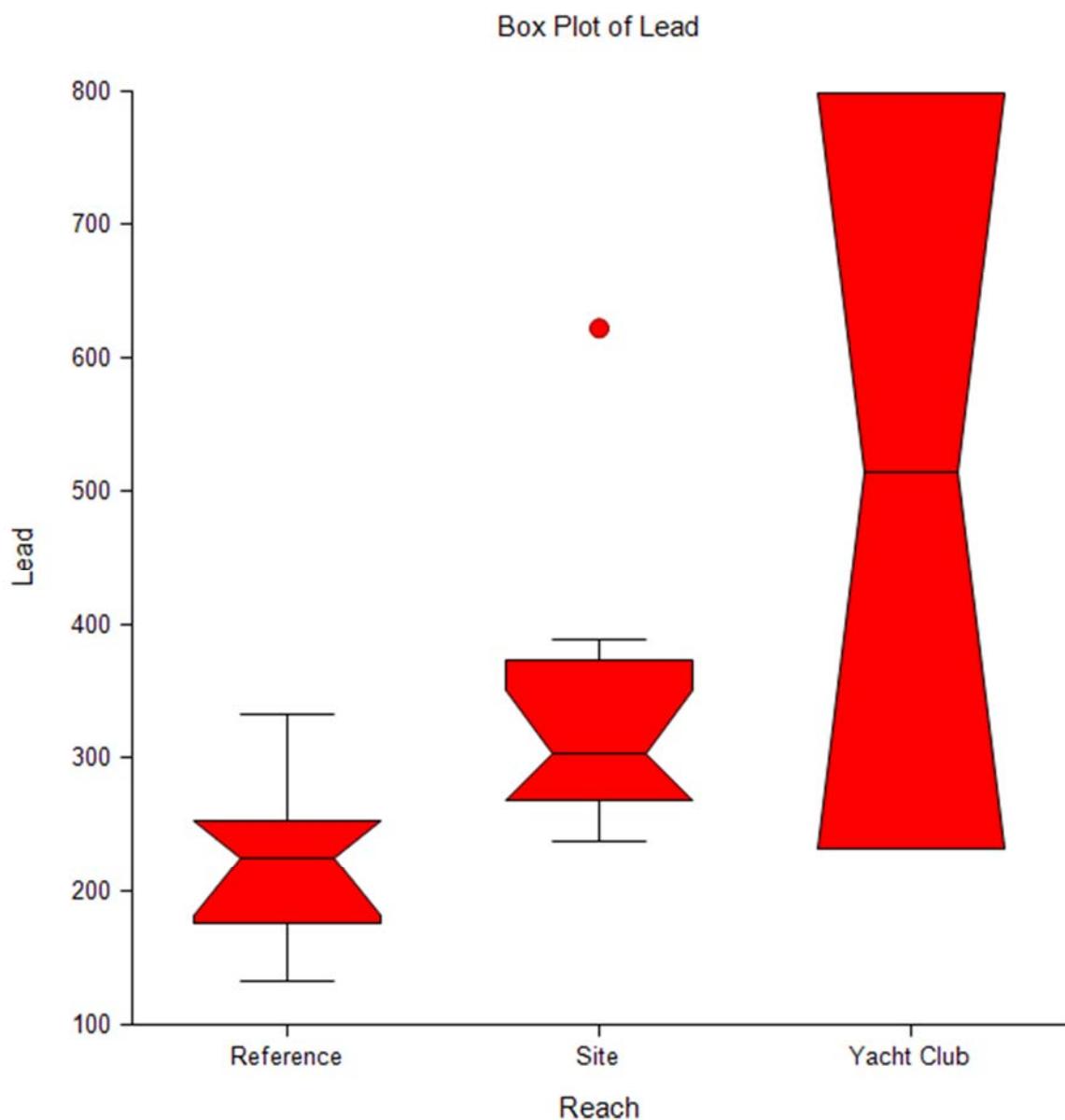
Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Box Plot of Copper



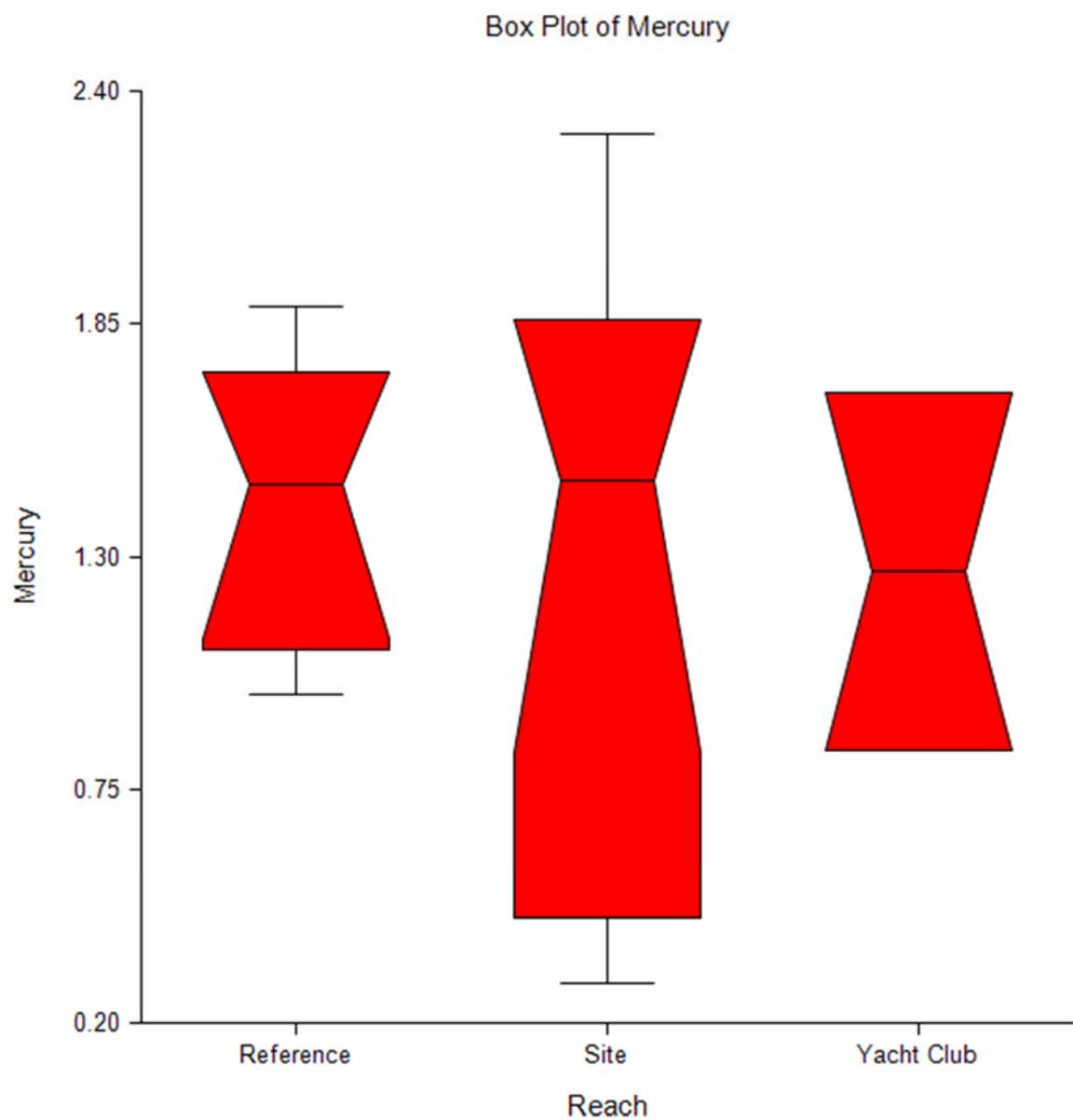
Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS



Dataset

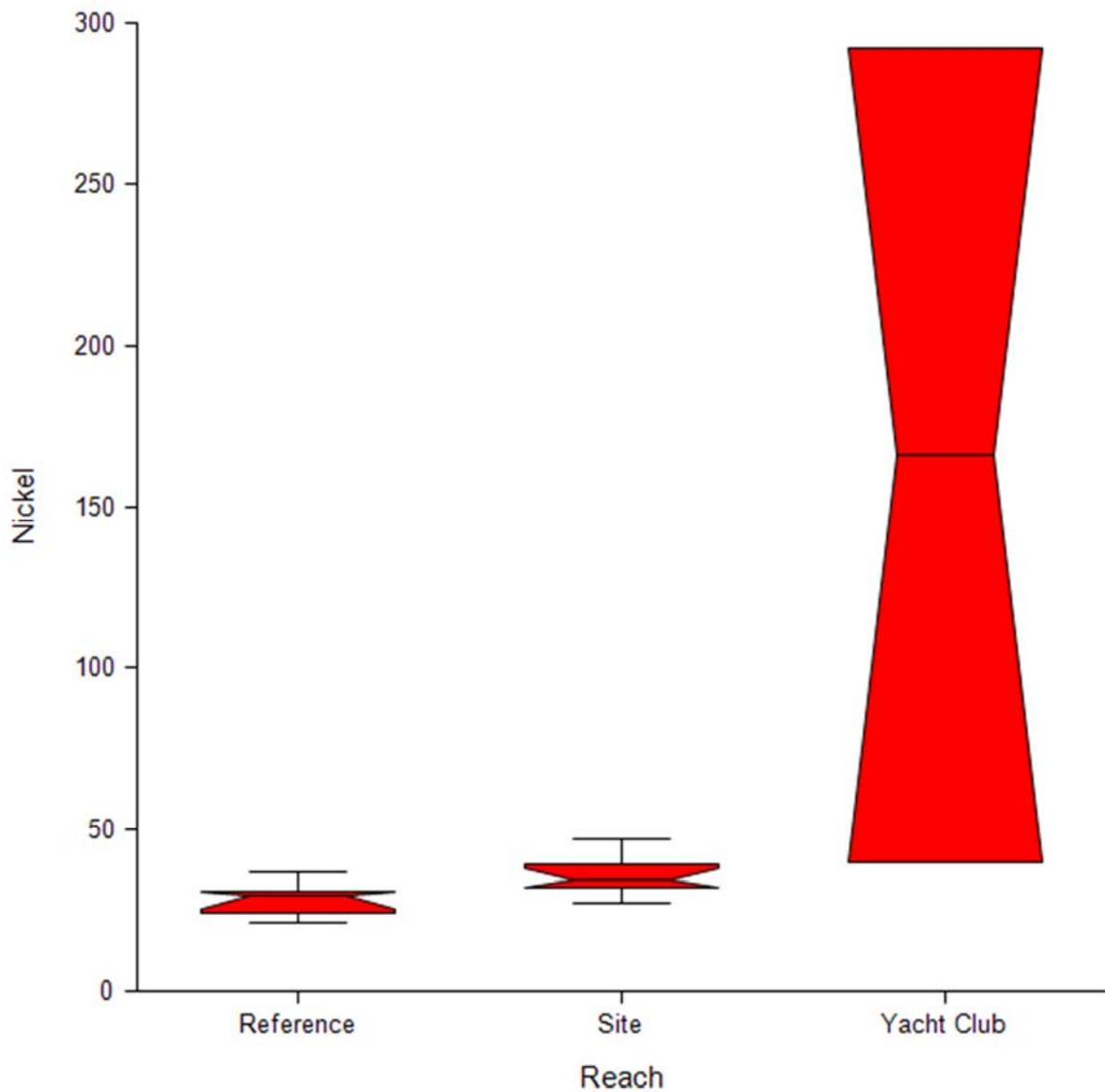
Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS



Dataset

Box Plot
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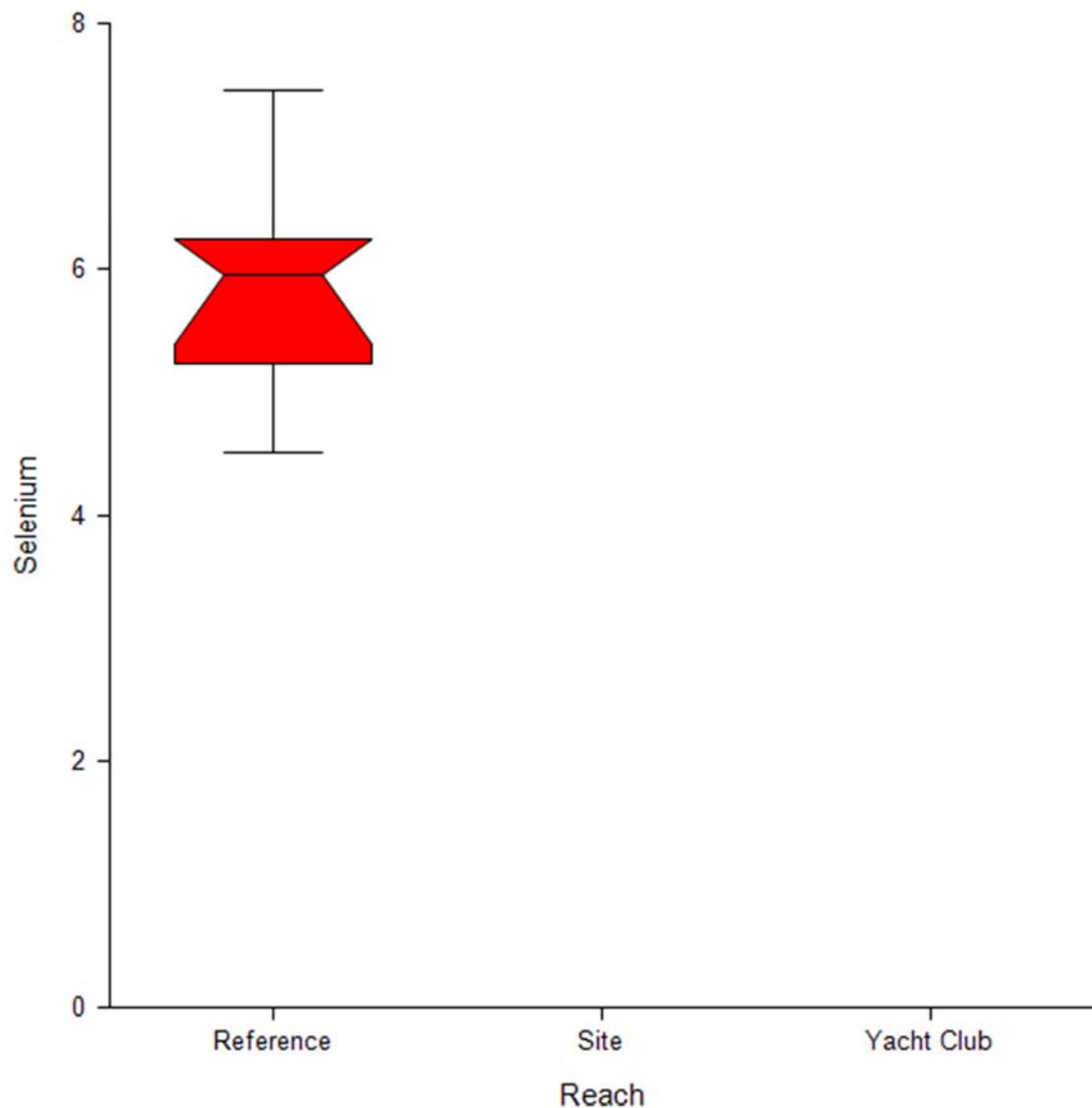
Box Plot of Nickel



Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

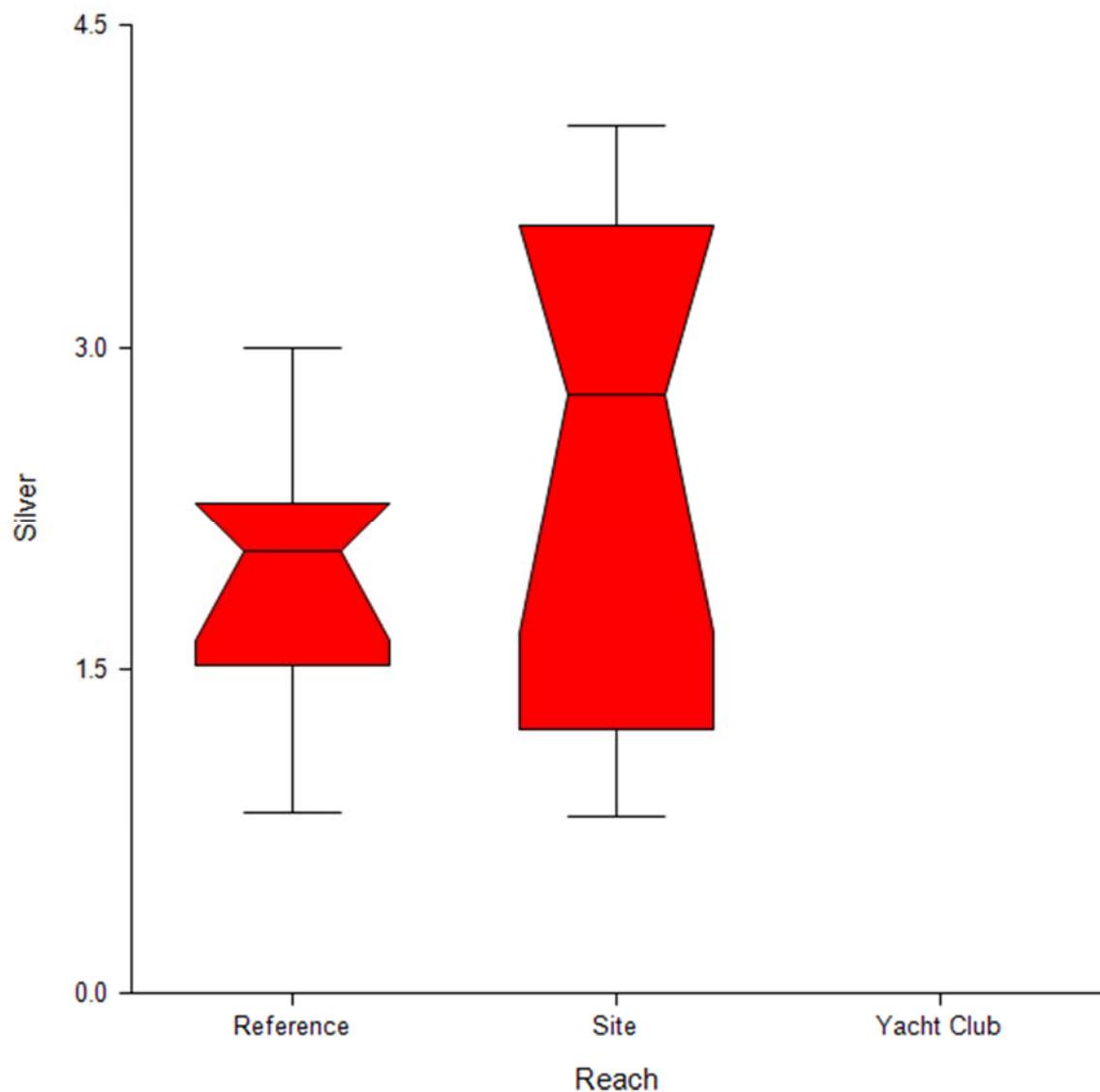
Box Plot of Selenium



Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

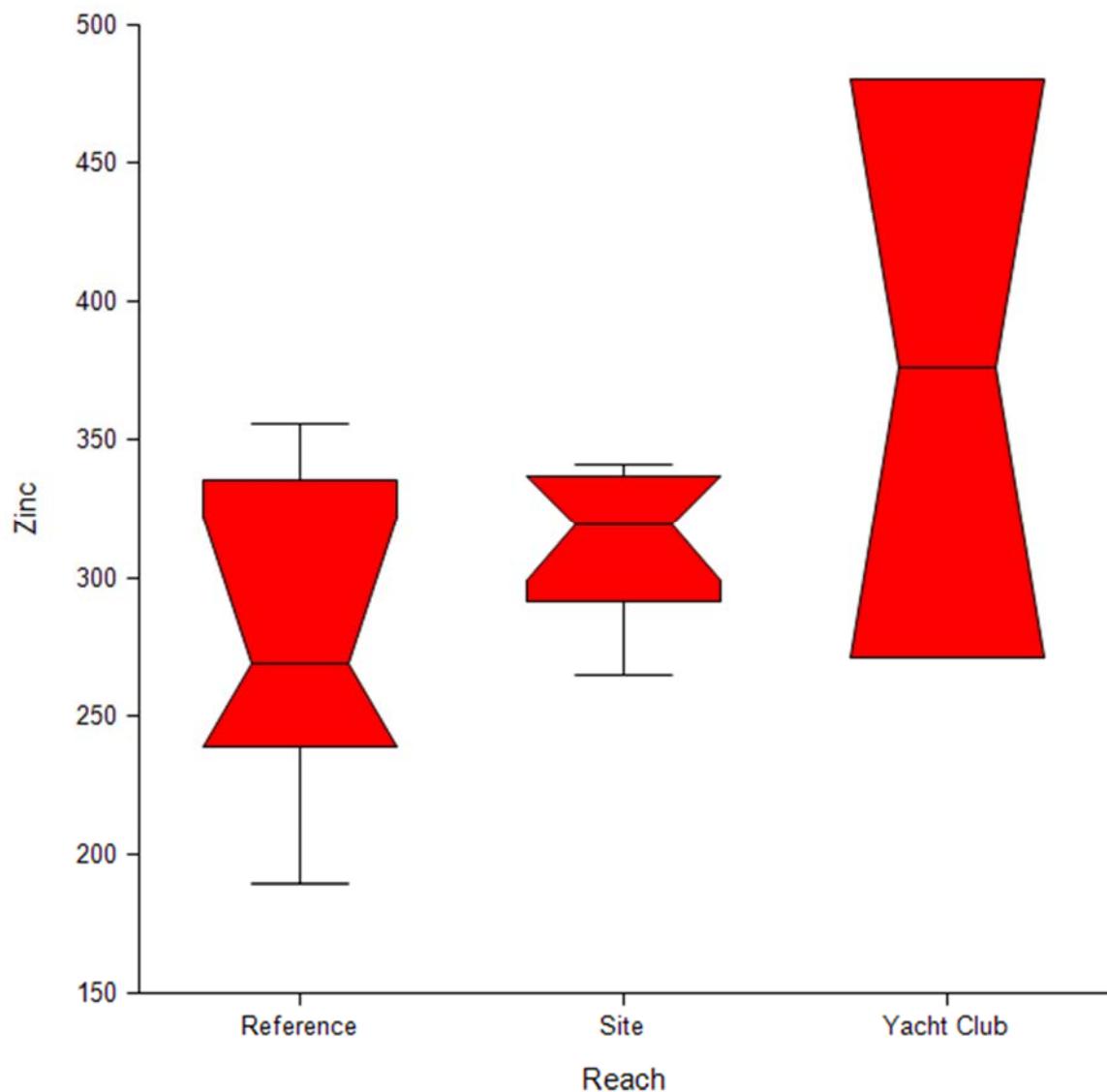
Box Plot of Silver



Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

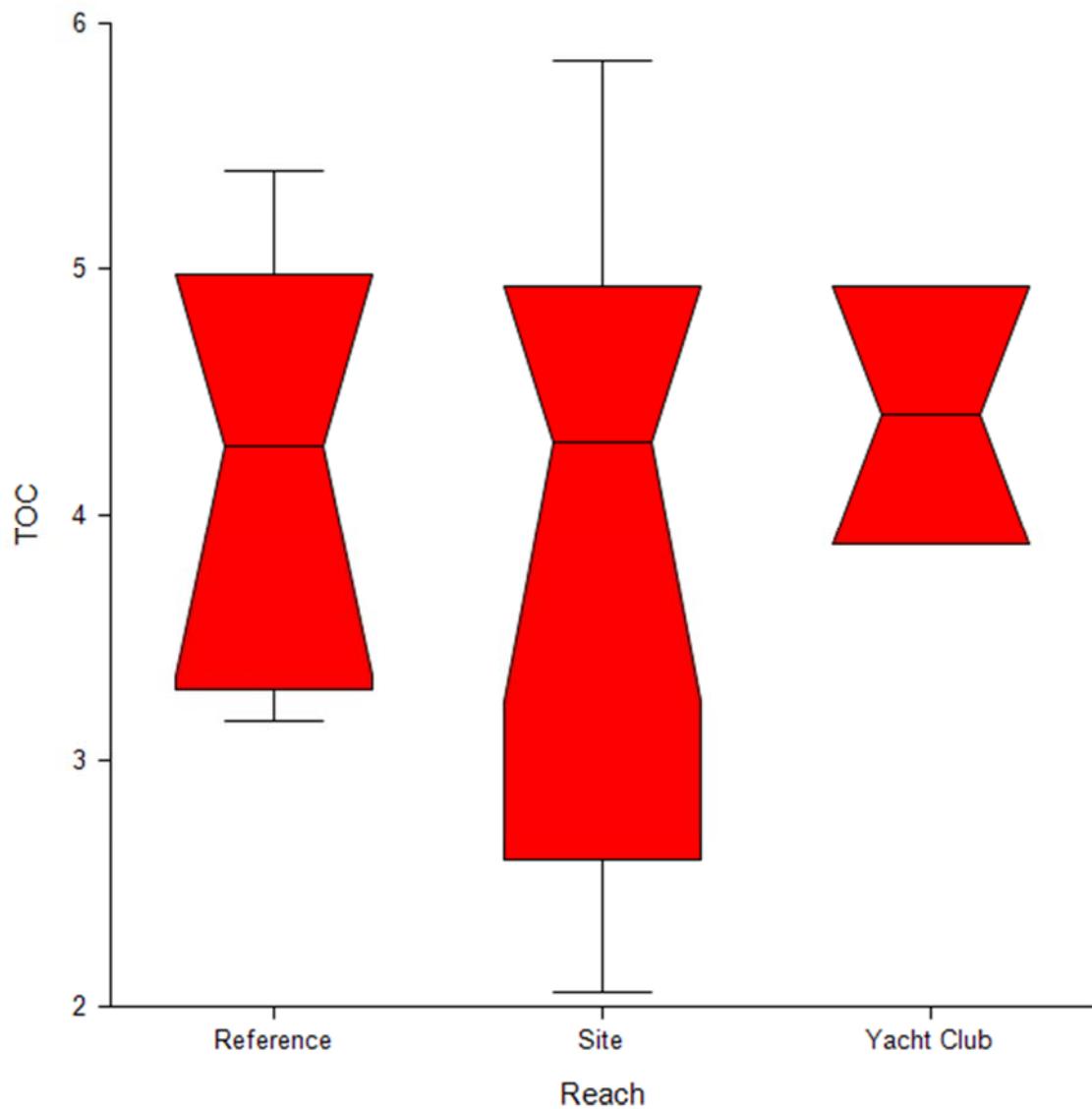
Box Plot of Zinc



Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

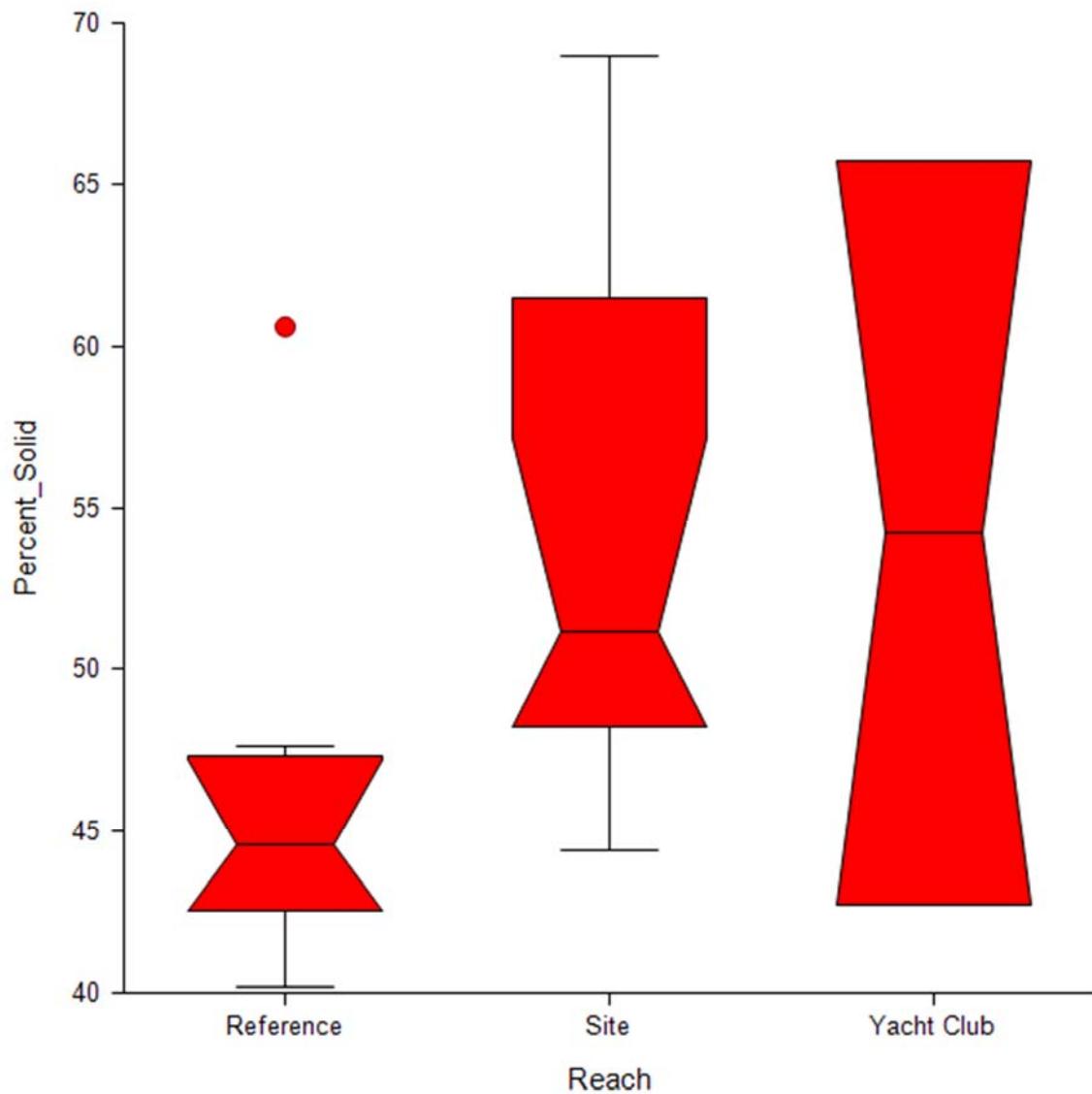
Box Plot of TOC



Dataset

Box Plot
...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS

Box Plot of Percent_Solid



APPENDIX D-3

**Statistical Tests for Means:
Anova Multiple Comparisons (Parametric)**

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Arsenic

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

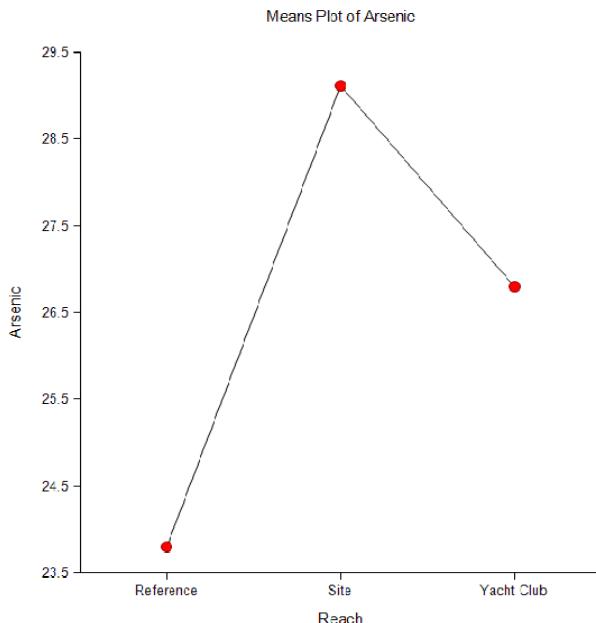
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	135.5327	67.76633			
	S	19	629.8906	33.15214			
	Total (Adjusted)	21	765.4233				
	Total	22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	26.57083	
A: Reach				
Reference		8	23.8	2.035686
Site		12	29.1125	1.662131
Yacht Club		2	26.8	4.071372

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Arsenic

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Arsenic
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	23.8	
Site	12	29.1125	
Yacht Club	2	26.8	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Arsenic
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=1.9392

If Control	Group	Count	Mean	Different From Groups
Reference	Reference	8	23.8	
Site	Site	12	29.1125	
Yacht Club	Yacht Club	2	26.8	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Arsenic

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Arsenic

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	29.1125	-1.010771	5.3125	11.63577	
Yacht Club	2	26.8	-7.952226	3	13.95223	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Arsenic

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	23.8	-11.65656	-5.3125	1.031557	
Yacht Club	2	26.8	-12.92814	-2.3125	8.303138	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Arsenic

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Arsenic

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	23.8	-13.48026	-3	7.480258	
Site	12	29.1125	-7.812391	2.3125	12.43739	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Arsenic

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.0930

Group	Count	Mean	Different From
			Groups
Reference	8	23.8	
Site	12	29.1125	
Yacht Club	2	26.8	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Arsenic

Newman-Keuls Multiple-Comparison Test

Response: Arsenic
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214

Group	Count	Mean	Different From Groups
Reference	8	23.8	
Site	12	29.1125	
Yacht Club	2	26.8	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Arsenic
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	23.8	
Site	12	29.1125	
Yacht Club	2	26.8	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Arsenic

Tukey-Kramer Multiple-Comparison Test

Response: Arsenic
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=33.15214 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	23.8	
Site	12	29.1125	
Yacht Club	2	26.8	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Barium

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

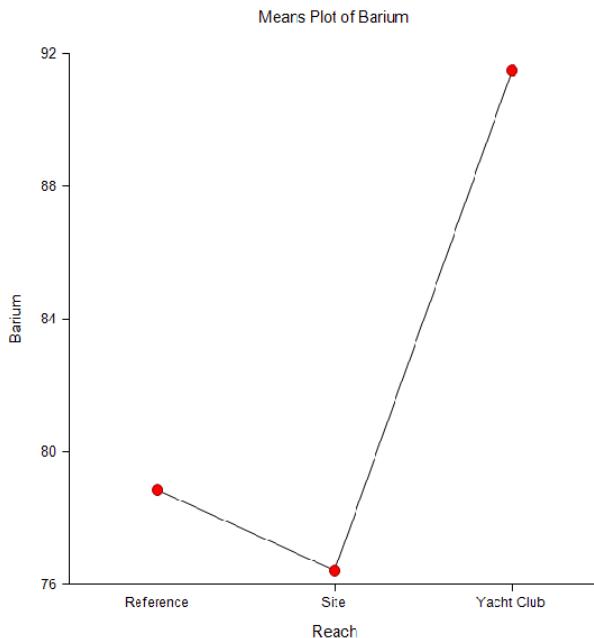
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	388.6408	194.3204		0.33	0.722380
	S	19	11159.95	587.3659			
	Total (Adjusted)	21	11548.59				
	Total	22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term	All	Count	Mean	Standard Error
	A: Reach	22	82.24583	
	Reference	8	78.8375	8.56859
	Site	12	76.425	6.996225
	Yacht Club	2	91.475	17.13718

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Barium

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Barium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Barium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=1.9392

If Control Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Barium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Barium

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	76.425	-29.02835	-2.4125	24.20335	
Yacht Club	2	91.475	-33.46251	12.6375	58.73751	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Barium

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	78.8375	-24.29085	2.4125	29.11585	
Yacht Club	2	91.475	-29.63325	15.05	59.73325	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Barium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Barium

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	78.8375	-56.7509	-12.6375	31.4759	
Site	12	76.425	-57.66759	-15.05	27.5676	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Barium

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.0930

Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Barium

Newman-Keuls Multiple-Comparison Test

Response: Barium
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659

Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Barium
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Barium

Tukey-Kramer Multiple-Comparison Test

Response: Barium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=587.3659 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	78.8375	
Site	12	76.425	
Yacht Club	2	91.475	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Cadmium

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	18	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

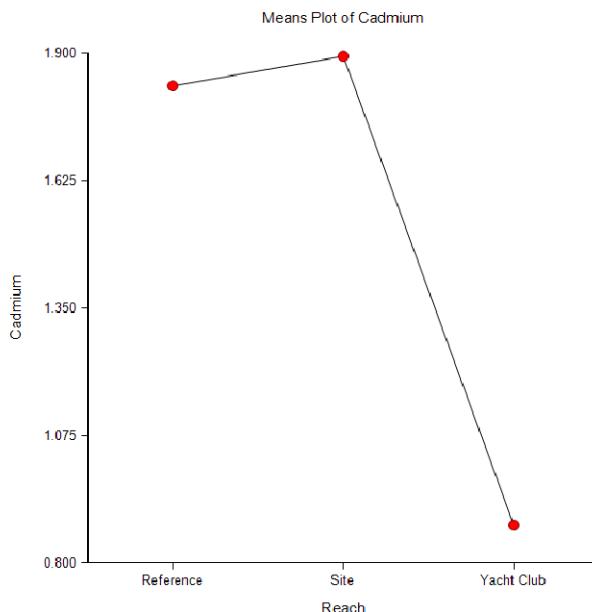
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	1.776538	0.8882692	1.44	0.262006	0.268459
	S	18	11.07117	0.6150651			
	Total (Adjusted)	20	12.84771				
	Total	21					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		21	1.534961	
A: Reach	Reference	8	1.83025	0.2772781
Site		11	1.893459	0.2364635
Yacht Club		2	0.881175	0.5545562

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Cadmium

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Cadmium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.6391

Group	Count	Mean	Different From Groups
Reference	8	1.83025	
Site	11	1.893459	
Yacht Club	2	0.881175	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Cadmium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=1.9479

If Control	Group	Count	Mean	Different From Groups
Reference	Reference	8	1.83025	
Site	Site	11	1.893459	
Yacht Club	Yacht Club	2	0.881175	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Cadmium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Cadmium

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.4174

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	11	1.893459	-0.8177143	0.06320909	0.9441325	
Yacht Club	2	0.881175	-2.447871	-0.949075	0.5497215	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Cadmium

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.4239

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	1.83025	-0.9465103	-0.06320909	0.8200921	
Yacht Club	2	0.881175	-2.473565	-1.012284	0.4489968	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Cadmium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Cadmium

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.3143

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	1.83025	-0.4858406	0.949075	2.383991	
Site	11	1.893459	-0.3829488	1.012284	2.407517	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Cadmium

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.1009

Group	Count	Mean	Different From Groups
Reference	8	1.83025	
Site	11	1.893459	
Yacht Club	2	0.881175	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Cadmium

Newman-Keuls Multiple-Comparison Test

Response: Cadmium
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651

Group	Count	Mean	Different From Groups
Reference	8	1.83025	
Site	11	1.893459	
Yacht Club	2	0.881175	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Cadmium
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=2.6663

Group	Count	Mean	Different From Groups
Reference	8	1.83025	
Site	11	1.893459	
Yacht Club	2	0.881175	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Cadmium

Tukey-Kramer Multiple-Comparison Test

Response: Cadmium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=18 MSE=0.6150651 Critical Value=3.6093

Group	Count	Mean	Different From Groups
Reference	8	1.83025	
Site	11	1.893459	
Yacht Club	2	0.881175	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

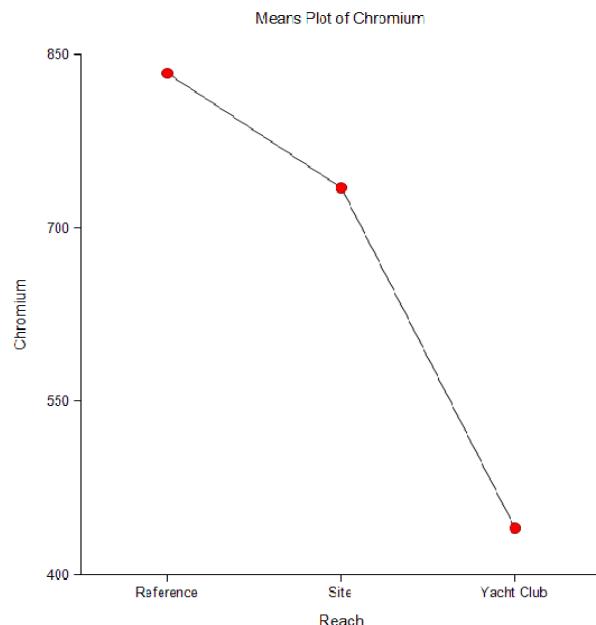
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	249673.3	124836.6			
	S	19	2261998	119052.5			
	Total (Adjusted)	21	2511671				
	Total	22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	669.6945	
A: Reach	Reference	8	833.75	121.99
Site		12	734.8333	99.60443
Yacht Club		2	440.5	243.98

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Chromium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Chromium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=1.9392

If Control Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Chromium

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	734.8333	-477.8434	-98.91666	280.0101	
Yacht Club	2	440.5	-1049.57	-393.25	263.0704	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Chromium

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	833.75	-281.2557	98.91666	479.0891	
Yacht Club	2	440.5	-930.4835	-294.3333	341.8168	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Chromium

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	833.75	-234.7873	393.25	1021.287	
Site	12	734.8333	-312.4084	294.3333	901.075	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Chromium

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.0930

Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Newman-Keuls Multiple-Comparison Test

Response: Chromium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5

Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Chromium
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Chromium

Tukey-Kramer Multiple-Comparison Test

Response: Chromium

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=119052.5 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	833.75	
Site	12	734.8333	
Yacht Club	2	440.5	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Reach		2	Yes	S(A)	S+sA
S(A)		19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

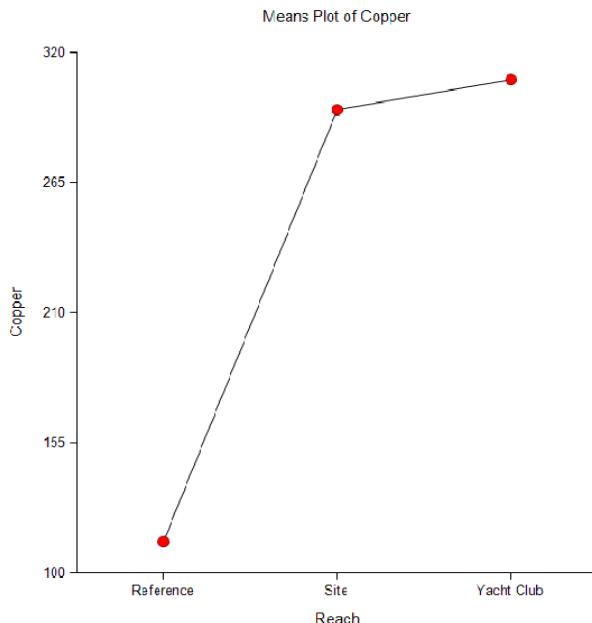
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Reach		2	173129.6	86564.8	1.15	0.339124	0.221633
S		19	1436022	75580.09			
Total (Adjusted)		21	1609151				
Total		22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term	All	Count	Mean	Standard Error
A: Reach		22	239.2833	
Reference		8	113.35	97.1983
Site		12	295.75	79.36208
Yacht Club		2	308.75	194.3966

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=1.9392

If Control Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Copper

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	295.75	-119.5185	182.4	484.3185	
Yacht Club	2	308.75	-327.5381	195.4	718.3381	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Copper

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	113.35	-485.311	-182.4	120.511	
Yacht Club	2	308.75	-493.867	13	519.867	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Copper

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	113.35	-695.803	-195.4	305.003	
Site	12	295.75	-496.4352	-13	470.4352	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Copper

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.0930

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Copper

Newman-Keuls Multiple-Comparison Test

Response: Copper
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Copper
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Tukey-Kramer Multiple-Comparison Test

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

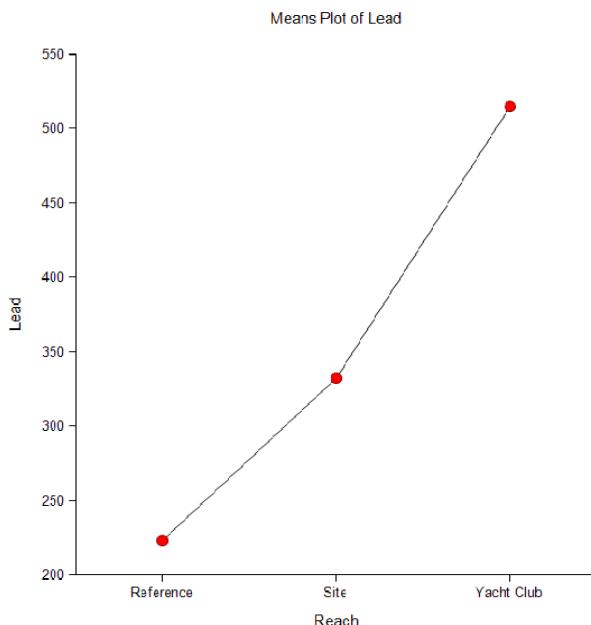
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	150526.3	75263.17	4.76	0.021093*	0.723472
	S	19	300396.3	15810.33			
	Total (Adjusted)	21	450922.6				
	Total	22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	356.75	
A: Reach	Reference	8	223	44.4555
Site		12	332.25	36.29776
Yacht Club		2	515	88.911

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=1.9392

If Control	Group	Count	Mean	Different From Groups
Reference	Reference	8	223	Yacht Club
Site	Site	12	332.25	
Yacht Club	Yacht Club	2	515	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Lead

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	332.25	-28.83816	109.25	247.3382	
Yacht Club	2	515	52.82429	292	531.1757	U

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Lead

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	223	-247.7921	-109.25	29.2921	
Yacht Club	2	515	-49.07528	182.75	414.5753	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Lead

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	223	-520.8688	-292	-63.13118	L
Site	12	332.25	-403.8583	-182.75	38.35829	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Lead

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.0930

Group	Count	Mean	Different From
			Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Newman-Keuls Multiple-Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	Yacht Club
Yacht Club	2	515	Reference, Site

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Lead

Tukey-Kramer Multiple-Comparison Test

Response: Lead
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Mercury

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Reach		2	Yes	S(A)	S+sA
S(A)		19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

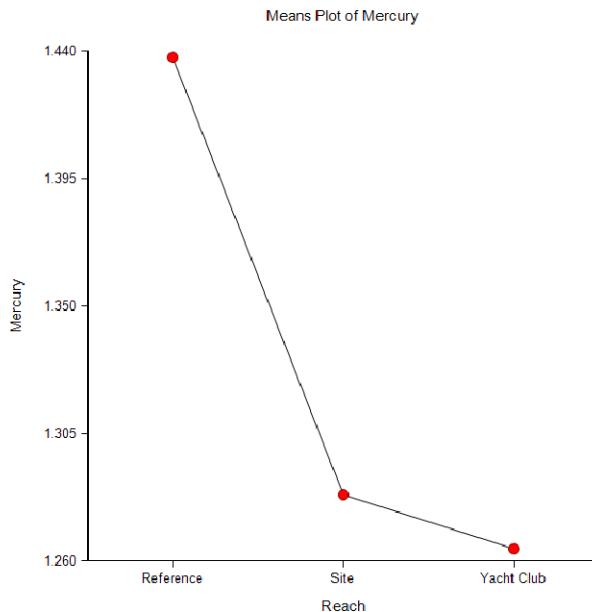
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Reach		2	0.1262474	0.06312372	0.18	0.837833	0.073760
S		19	6.71548	0.3534463			
Total (Adjusted)		21	6.841728				
Total		22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	1.328625	
A: Reach				
Reference		8	1.437875	0.2101923
Site		12	1.2835	0.1716213
Yacht Club		2	1.2645	0.4203846

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Mercury

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Mercury
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Mercury
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=1.9392

If Control Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Mercury

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Mercury

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	1.2835	-0.8072766	-0.154375	0.4985266	
Yacht Club	2	1.2645	-1.304234	-0.173375	0.9574838	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Mercury

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	1.437875	-0.5006729	0.154375	0.8094229	
Yacht Club	2	1.2645	-1.115105	-0.019	1.077105	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Mercury

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Mercury

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	1.437875	-0.9087512	0.173375	1.255501	
Site	12	1.2835	-1.026433	0.019	1.064433	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Mercury

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.0930

Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Mercury

Newman-Keuls Multiple-Comparison Test

Response: Mercury
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463

Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Mercury
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Mercury

Tukey-Kramer Multiple-Comparison Test

Response: Mercury
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=0.3534463 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	1.437875	
Site	12	1.2835	
Yacht Club	2	1.2645	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Nickel

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	2	Yes	S(A)	S+sA
	S(A)	19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

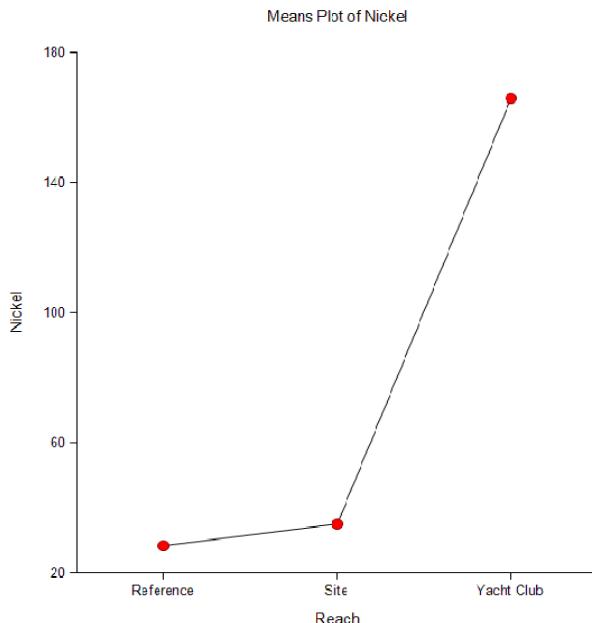
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	2	32721.97	16360.98	9.56	0.001338*	0.959053
	S	19	32503.56	1710.714			
	Total (Adjusted)	21	65225.53				
	Total	22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	76.47083	
A: Reach	Reference	8	28.1625	14.62324
Site		12	35.2	11.93983
Yacht Club		2	166.05	29.24649

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Nickel

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Nickel
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	28.1625	Yacht Club
Site	12	35.2	Yacht Club
Yacht Club	2	166.05	Reference, Site

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Nickel
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=1.9392

If Control	Group	Count	Mean	Different From Groups
Reference	Reference	8	28.1625	Yacht Club
Site	Site	12	35.2	Yacht Club
Yacht Club	Yacht Club	2	166.05	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Nickel

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Nickel

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	35.2	-38.38538	7.0375	52.46038	
Yacht Club	2	166.05	59.21276	137.8875	216.5622	U

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Nickel

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	28.1625	-52.6097	-7.0375	38.5347	
Yacht Club	2	166.05	54.59312	130.85	207.1069	U

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Nickel

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Nickel

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	28.1625	-213.1719	-137.8875	-62.60312	L
Site	12	35.2	-203.5816	-130.85	-58.11838	L

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Nickel

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.0930

Group	Count	Mean	Different From
			Groups
Reference	8	28.1625	Yacht Club
Site	12	35.2	Yacht Club
Yacht Club	2	166.05	Reference, Site

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Nickel

Newman-Keuls Multiple-Comparison Test

Response: Nickel
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714

Group	Count	Mean	Different From Groups
Reference	8	28.1625	Yacht Club
Site	12	35.2	Yacht Club
Yacht Club	2	166.05	Reference, Site

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Nickel
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	28.1625	Yacht Club
Site	12	35.2	Yacht Club
Yacht Club	2	166.05	Reference, Site

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Nickel

Tukey-Kramer Multiple-Comparison Test

Response: Nickel
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=1710.714 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	28.1625	Yacht Club
Site	12	35.2	Yacht Club
Yacht Club	2	166.05	Reference, Site

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Silver

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
	A: Reach	1	Yes	S(A)	S+sA
	S(A)	17	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

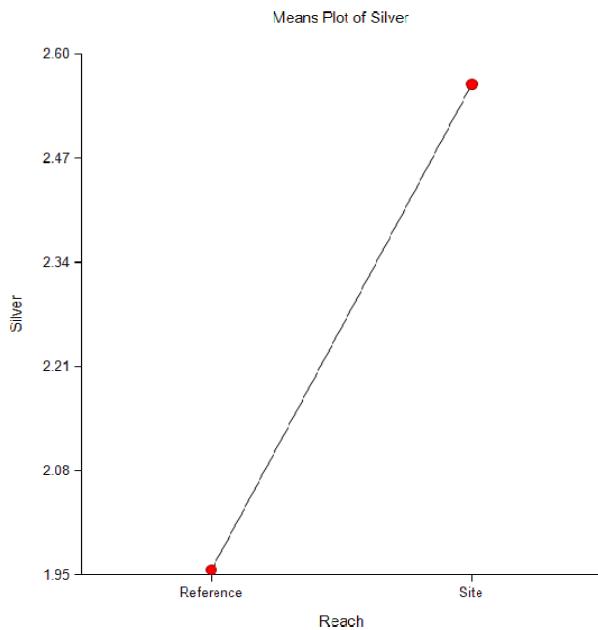
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
	A: Reach	1	1.695592	1.695592			
	S	17	16.47204	0.9689435			
	Total (Adjusted)	18	18.16763				
	Total	19					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		19	2.259653	
A: Reach				
Reference		8	1.957125	0.34802
Site		11	2.562182	0.2967925

Plots Section



Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Silver

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Silver
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.1098

Group	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Silver
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=1.7396

If Control	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Silver
Term A: Reach
Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.1098

Treatment	Count	Mean	Lower 95.0%	Difference	Upper 95.0%	Test
Group			Simult.C.I.	With Control	Simult.C.I.	Result
Site	11	2.562182	-0.3599474	0.6050568	1.570061	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group. Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Silver

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Silver

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.1098

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	1.957125	-1.570061	-0.6050568	0.3599474	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Silver

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.1098

Group	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Silver

Newman-Keuls Multiple-Comparison Test

Response: Silver
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435

Group	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Silver
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.1098

Group	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Tukey-Kramer Multiple-Comparison Test

Response: Silver
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=17 MSE=0.9689435 Critical Value=2.9837

Group	Count	Mean	Different From Groups
Reference	8	1.957125	
Site	11	2.562182	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Zinc

Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Reach		2	Yes	S(A)	S+sA
S(A)		19	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

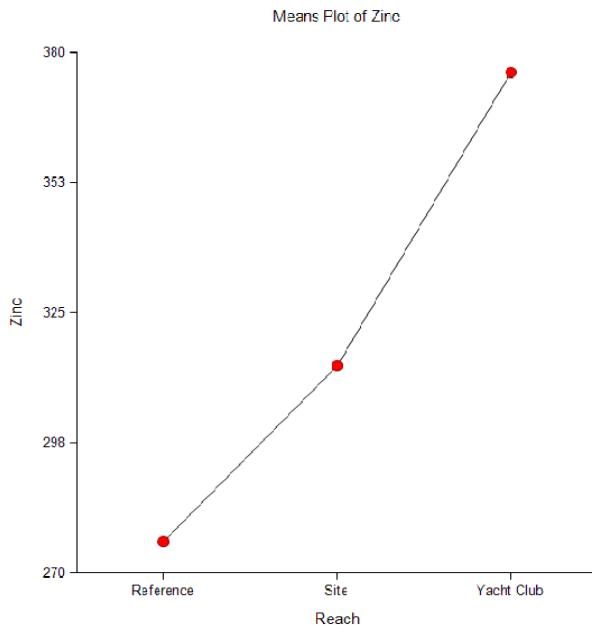
Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Reach		2	17436.13	8718.065	3.23	0.061977	0.545650
S		19	51269.19	2698.378			
Total (Adjusted)		21	68705.32				
Total		22					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term		Count	Mean	Standard Error
All		22	322.0417	
A: Reach				
Reference		8	276.5	18.36566
Site		12	313.875	14.99549
Yacht Club		2	375.75	36.73131

Plots Section



Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Zinc

Bonferroni (All-Pairwise) Multiple Comparison Test

Response: Zinc
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	276.5	
Site	12	313.875	
Yacht Club	2	375.75	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Dunnett's Upper One-Sided Multiple-Comparison Test With Control

Response: Zinc
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=1.9392

If Control Group	Count	Mean	Different From Groups
Reference	8	276.5	Yacht Club
Site	12	313.875	
Yacht Club	2	375.75	

Notes:

This section presents the results of one-sided comparisons of each group versus the control. Only those groups that were better than the control group are listed. Since the actual control group is not specified, a separate line is generated assuming that each group is the control group. Only use the line of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Zinc

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Zinc

Term A: Reach

Control Group: Reference

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.4061

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Site	12	313.875	-19.67261	37.375	94.42261	
Yacht Club	2	375.75	0.4406499	99.25	198.0594	U

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Zinc

Term A: Reach

Control Group: Site

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.4140

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	276.5	-94.61014	-37.375	19.86014	
Yacht Club	2	375.75	-33.89771	61.875	157.6477	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Zinc

Dunnett's Simultaneous Confidence Intervals for Treatment vs. Control

Response: Zinc

Term A: Reach

Control Group: Yacht Club

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.3024

Treatment Group	Count	Mean	Lower 95.0% Simult.C.I.	Difference With Control	Upper 95.0% Simult.C.I.	Test Result
Reference	8	276.5	-193.8013	-99.25	-4.698679	L
Site	12	313.875	-153.2203	-61.875	29.47025	

Notes:

This report provides joint simultaneous confidence intervals for the differences between the means of each group and the control group.

Since the actual control group is not specified, a separate section is generated assuming that each group is the control group. Only use the section of the report that uses the actual control group.

Fisher's LSD Multiple-Comparison Test

Response: Zinc

Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.0930

Group	Count	Mean	Different From
			Groups
Reference	8	276.5	Yacht Club
Site	12	313.875	
Yacht Club	2	375.75	Reference

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. When this procedure is used only after the F-test associated with this term is significant at the same error rate, these tests are approximately accurate.

When the F-test associated with this term is ignored, this procedure does not account for the multiplicity of tests. In either case, the Tukey-Kramer test is better.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Zinc

Newman-Keuls Multiple-Comparison Test

Response: Zinc
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378

Group	Count	Mean	Different From Groups
Reference	8	276.5	Yacht Club
Site	12	313.875	
Yacht Club	2	375.75	Reference

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Zinc
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	276.5	
Site	12	313.875	
Yacht Club	2	375.75	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Zinc

Tukey-Kramer Multiple-Comparison Test

Response: Zinc
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=2698.378 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	276.5	
Site	12	313.875	
Yacht Club	2	375.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

APPENDIX D-4

**Statistical Tests for Means:
Mann Whitney U and Kruskal Wallis
(Nonparametric)**

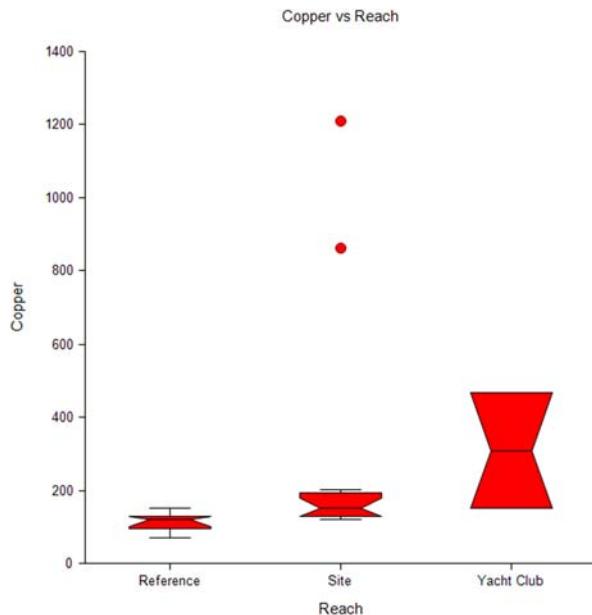
Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Copper

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision
Skewness Normality of Residuals	4.1670	0.000031	Reject
Kurtosis Normality of Residuals	3.4305	0.000603	Reject
Omnibus Normality of Residuals	29.1319	0.000000	Reject
Modified-Levene Equal-Variance Test	0.7523	0.397157	Accept

Box Plot Section



Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Reach		2	Yes	S(A)	S+sA
S(A)		19	No	S(A)	S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Reach		2	173129.6	86564.8	1.15	0.339124	0.221633
S(A)		19	1436022	75580.09			
Total (Adjusted)		21	1609151				
Total		22					

* Term significant at alpha = 0.05

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

H0: All medians are equal.

Ha: At least two medians are different.

Test Results

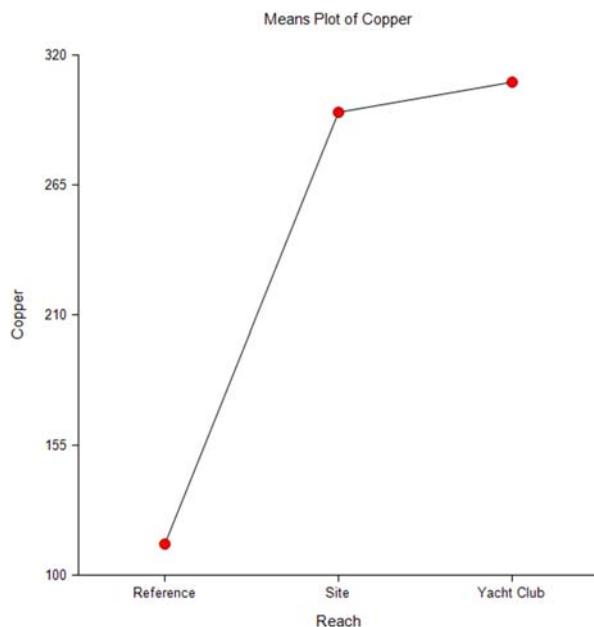
Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	10.19318	0.006118	Reject H0
Corrected for Ties	2	10.22204	0.006030	Reject H0
Number Sets of Ties	5			
Multiplicity Factor	30			

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Reference	8	46.00	5.75	-3.1396	119.5
Site	12	172.50	14.38	2.2749	150.5
Yacht Club	2	34.50	17.25	1.3134	308.75

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	22	230.6045		239.2833
A: Reach				
Reference	8	113.35	97.1983	-125.9333
Site	12	295.75	79.36208	56.46667
Yacht Club	2	308.75	194.3966	69.46667

Analysis of Variance ReportDataset
Response...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Copper**Plots of Means Section****Bonferroni (All-Pairwise) Multiple Comparison Test**

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Response Copper

Newman-Keuls Multiple-Comparison Test

Response: Copper
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Copper
 Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Copper

Tukey-Kramer Multiple-Comparison Test

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09 Critical Value=3.5928

Group	Count	Mean	Different From Groups
Reference	8	113.35	
Site	12	295.75	
Yacht Club	2	308.75	

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Planned Comparison: A1

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09

Comparison Value=377.8 T-Value=1.3203 Prob>|T|=0.202416 Decision(0.05)=Do Not Reject
Comparison Std Error = 286.1441 Comparison Confidence Interval = -221.1064 to 976.7064

Group	Comparison		
	Coefficient	Count	Mean
Reference	-2	8	113.35
Site	1	12	295.75
Yacht Club	1	2	308.75

Planned Comparison: A2

Response: Copper
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=75580.09

Comparison Value=13 T-Value=0.0619 Prob>|T|=0.951279 Decision(0.05)=Do Not Reject
Comparison Std Error = 209.9723 Comparison Confidence Interval = -426.4771 to 452.4771

Group	Comparison		
	Coefficient	Count	Mean
Reference	0	8	113.35
Site	-1	12	295.75
Yacht Club	1	2	308.75

Notes:

This section presents the results of a standard set of planned comparisons. The first comparison compares the first group with those below it (alphabetically). The second comparison compares the second group with those below it (alphabetically) ignoring the first. This continues to the next to the last group.

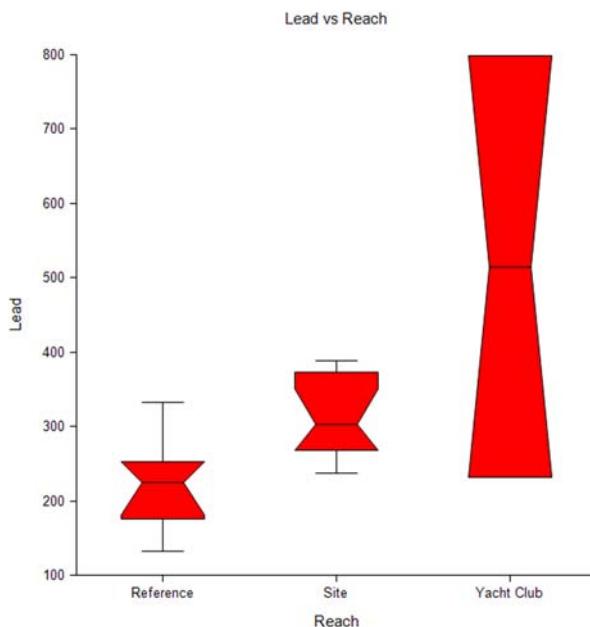
Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Tests of Assumptions Section

Assumption	Test Value	Prob Level	Decision
Skewness Normality of Residuals	1.4823	0.138264	Accept
Kurtosis Normality of Residuals	2.1421	0.032187	Reject
Omnibus Normality of Residuals	6.7857	0.033613	Reject
Modified-Levene Equal-Variance Test	9.1861	0.007186	Reject

Box Plot Section



Expected Mean Squares Section

Source	Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Reach		2	Yes	S(A)	S+A
S(A)		19	No	S(A)	S(A)

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

Source	Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
A: Reach		2	150526.3	75263.17	4.76	0.021093*	0.723472
S(A)		19	300396.3	15810.33			
Total (Adjusted)		21	450922.6				
Total		22					

* Term significant at alpha = 0.05

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Kruskal-Wallis One-Way ANOVA on Ranks

Hypotheses

H0: All medians are equal.

Ha: At least two medians are different.

Test Results

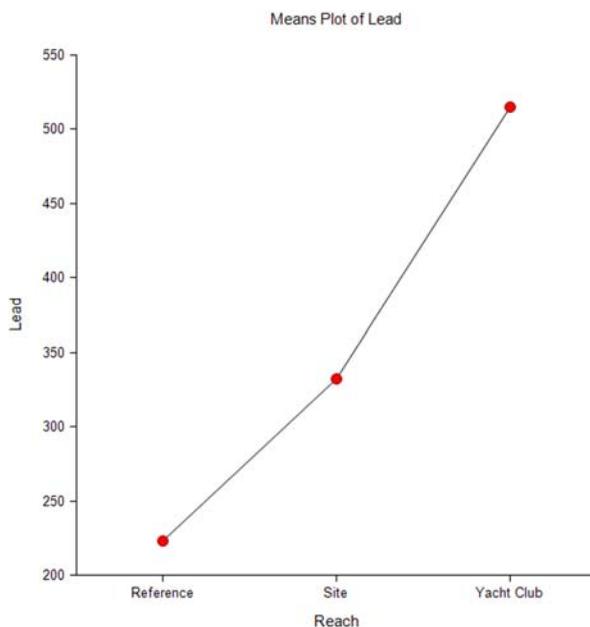
Method	DF	Chi-Square (H)	Prob Level	Decision(0.05)
Not Corrected for Ties	2	8.430089	0.014772	Reject H0
Corrected for Ties	2	8.43962	0.014701	Reject H0
Number Sets of Ties	2			
Multiplicity Factor	12			

Group Detail

Group	Count	Sum of Ranks	Mean Rank	Z-Value	Median
Reference	8	49.50	6.19	-2.9007	224
Site	12	175.50	14.63	2.4727	302.5
Yacht Club	2	28.00	14.00	0.5710	515

Means and Effects Section

Term	Count	Mean	Standard Error	Effect
All	22	309.1364		356.75
A: Reach				
Reference	8	223	44.4555	-133.75
Site	12	332.25	36.29776	-24.5
Yacht Club	2	515	88.911	158.25

Analysis of Variance ReportDataset
Response...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Lead**Plots of Means Section****Bonferroni (All-Pairwise) Multiple Comparison Test**Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.6251

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This section presents the results of all paired comparisons among the means. Since this procedure uses the Bonferroni inequality, it is not as accurate as the Tukey-Kramer's method.

Analysis of Variance Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Newman-Keuls Multiple-Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	Yacht Club
Yacht Club	2	515	Reference, Site

Notes:

This report provides multiple comparison tests for all pairwise differences between the means. According to Hsu(1996, page 127), the specified family-wise error rate (alpha) is overstated and the Tukey-Kramer method is recommended instead.

Scheffe's Multiple-Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=2.6540

Group	Count	Mean	Different From Groups
Reference	8	223	Yacht Club
Site	12	332.25	Reference
Yacht Club	2	515	

Notes:

This report provides multiple comparison tests for all possible contrasts among the means. These contrasts may involve more groups than just each pair, so the method is much stricter than need be. The Tukey-Kramer method provides more accurate results when only pairwise comparisons are needed.

Analysis of Variance Report

Dataset ...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Response Lead

Tukey-Kramer Multiple-Comparison Test

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33 Critical Value=3.5928

Group	Count	Mean	Different From
			Groups
Reference	8	223	Yacht Club
Site	12	332.25	
Yacht Club	2	515	Reference

Notes:

This report provides multiple comparison tests for all pairwise differences between the means.

Planned Comparison: A1

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33

Comparison Value=401.25 T-Value=3.0659 Prob>|T|=0.006360 Decision(0.05)=Reject
Comparison Std Error = 130.8734 Comparison Confidence Interval = 127.3288 to 675.1713

Group	Comparison	Count	Mean
	Coefficient		
Reference	-2	8	223
Site	1	12	332.25
Yacht Club	1	2	515

Planned Comparison: A2

Response: Lead
Term A: Reach

Alpha=0.050 Error Term=S(A) DF=19 MSE=15810.33

Comparison Value=182.75 T-Value=1.9030 Prob>|T|=0.072311 Decision(0.05)=Do Not Reject
Comparison Std Error = 96.03484 Comparison Confidence Interval = -18.25324 to 383.7532

Group	Comparison	Count	Mean
	Coefficient		
Reference	0	8	223
Site	-1	12	332.25
Yacht Club	1	2	515

Notes:

This section presents the results of a standard set of planned comparisons. The first comparison compares the first group with those below it (alphabetically). The second comparison compares the second group with those below it (alphabetically) ignoring the first. This continues to the next to the last group.

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Reference	8	113.35	24.6525	8.715975	92.74	133.96
Reach=Site	12	295.75	354.3707	102.298	70.59362	520.9064

Note: T-alpha (Reach=Reference) = 2.3646, T-alpha (Reach=Site) = 2.2010

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	18	-182.4	277.4505	126.6383	-448.4571	83.65713
Unequal	11.16	-182.4	355.2271	102.6686	-407.9791	43.17905

Note: T-alpha (Equal) = 2.1009, T-alpha (Unequal) = 2.1972

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-1.4403	0.166944	No	0.276041	0.103182
Difference < 0	-1.4403	0.083472	No	0.397893	0.160601
Difference > 0	-1.4403	0.916528	No	0.001210	0.000123

Difference: (Reach=Reference)-(Reach=Site)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-1.7766	0.102872	No	0.368765	0.146599
Difference < 0	-1.7766	0.051436	No	0.509134	0.223859
Difference > 0	-1.7766	0.948564	No	0.000448	0.000045

Difference: (Reach=Reference)-(Reach=Site)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Reference)	-0.5548	0.579050	Cannot reject normality
Kurtosis Normality (Reach=Reference)	0.3765	0.706550	Cannot reject normality
Omnibus Normality (Reach=Reference)	0.4495	0.798708	Cannot reject normality
Skewness Normality (Reach=Site)	3.1592	0.001582	Reject normality
Kurtosis Normality (Reach=Site)	2.3038	0.021231	Reject normality
Omnibus Normality (Reach=Site)	15.2885	0.000479	Reject normality
Variance-Ratio Equal-Variance Test	206.6301	0.000000	Reject equal variances
Modified-Levene Equal-Variance Test	1.4349	0.246500	Cannot reject equal variances

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Reference	8	119.5	70.2	133
Reach=Site	12	150.5	129	202

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

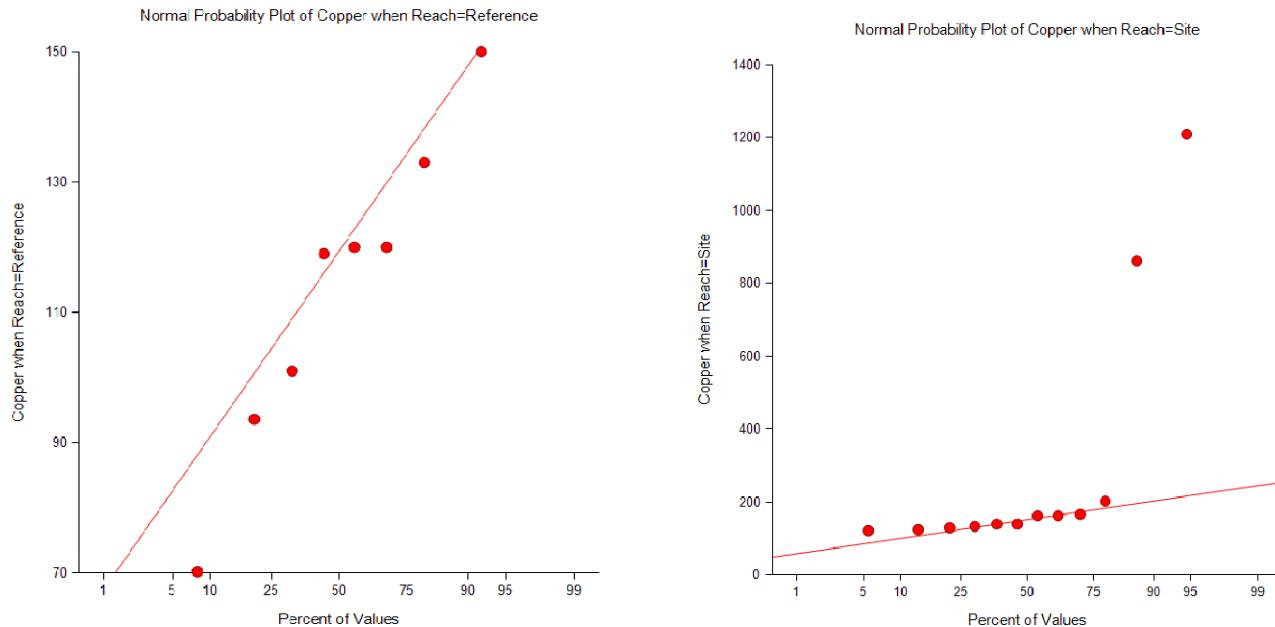
Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Reference	9.5	45.5	84	12.94198
Reach=Site	86.5	164.5	126	12.94198
Number Sets of Ties = 4, Multiplicity Factor = 24				

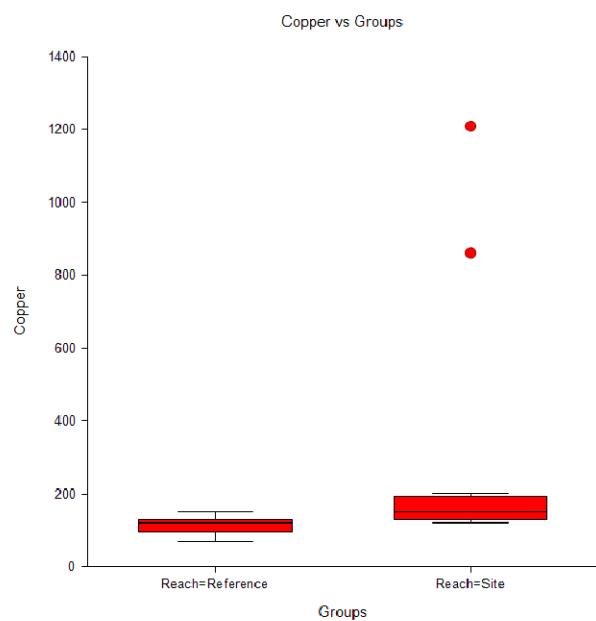
Alternative Hypothesis	Exact Probability		Approx. Without Correction		Approx. With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level
Diff<>0			-2.9748	0.002932	Yes	-2.9362	0.003323
Diff<0			-2.9748	0.001466	Yes	-2.9362	0.001661
Diff>0			-2.9748	0.998534	No	-3.0135	0.998709

Kolmogorov-Smirnov Test For Different Distributions

Alternative Hypothesis	Dmn Criterion	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.750000	0.5726	0.050	Yes	0.0048
D(1)<D(2)	0.750000	0.5726	0.025	Yes	
D(1)>D(2)	0.000000	0.5726	0.025	No	

Plots Section



Two-Sample Test ReportDataset
Variable...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Copper

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Reference	8	113.35	24.6525	8.715975	92.74	133.96
Reach=Yacht Club	2	308.75	224.5064	158.75	-1708.36	2325.86

Note: T-alpha (Reach=Reference) = 2.3646, T-alpha (Reach=Yacht Club) = 12.7062

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	8	-195.4	82.65693	65.34604	-346.0882	-44.71176
Unequal	1.01	-195.4	225.8559	158.9891	-2187.127	1796.327

Note: T-alpha (Equal) = 2.3060, T-alpha (Unequal) = 12.5274

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-2.9902	0.017328	Yes	0.745318	0.424301
Difference < 0	-2.9902	0.008664	Yes	0.859859	0.562531
Difference > 0	-2.9902	0.991336	No	0.000005	0.000000

Difference: (Reach=Reference)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-1.2290	0.433890	No	0.083668	0.016772
Difference < 0	-1.2290	0.216945	No	0.159531	0.032213
Difference > 0	-1.2290	0.783055	No	0.006635	0.001321

Difference: (Reach=Reference)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Reference)	-0.5548	0.579050	Cannot reject normality
Kurtosis Normality (Reach=Reference)	0.3765	0.706550	Cannot reject normality
Omnibus Normality (Reach=Reference)	0.4495	0.798708	Cannot reject normality
Skewness Normality (Reach=Yacht Club)	0.0000		
Kurtosis Normality (Reach=Yacht Club)		1.000000	Cannot reject normality
Omnibus Normality (Reach=Yacht Club)			
Variance-Ratio Equal-Variance Test	82.9346	0.000079	Reject equal variances
Modified-Levene Equal-Variance Test	0.0000	0.000000	

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Reference	8	119.5	70.2	133
Reach=Yacht Club	2	308.75		

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

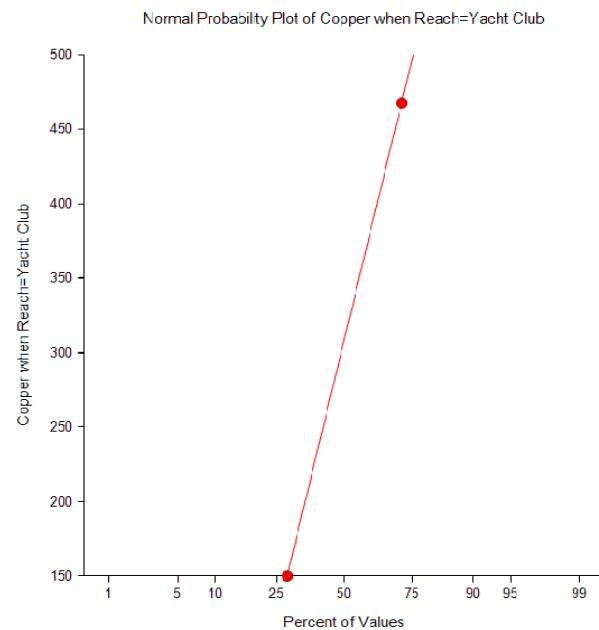
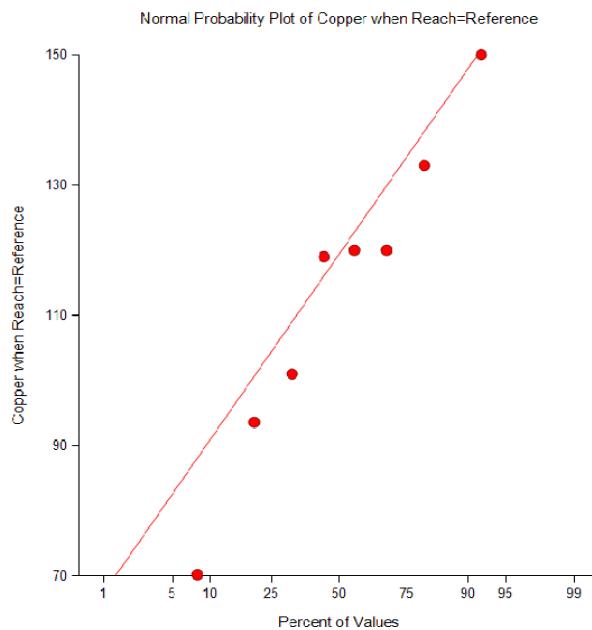
Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Reference	0.5	36.5	44	3.806427
Reach=Yacht Club	15.5	18.5	11	3.806427
Number Sets of Ties = 2, Multiplicity Factor = 12				

Alternative Hypothesis	Exact Probability		Approx. Without Correction			Approx. With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050
Diff<>0			1.9704	0.048798	Yes	1.8390	0.065916	No
Diff<0			1.9704	0.024399	Yes	1.8390	0.032958	Yes
Diff>0			1.9704	0.975601	No	2.1017	0.982211	No

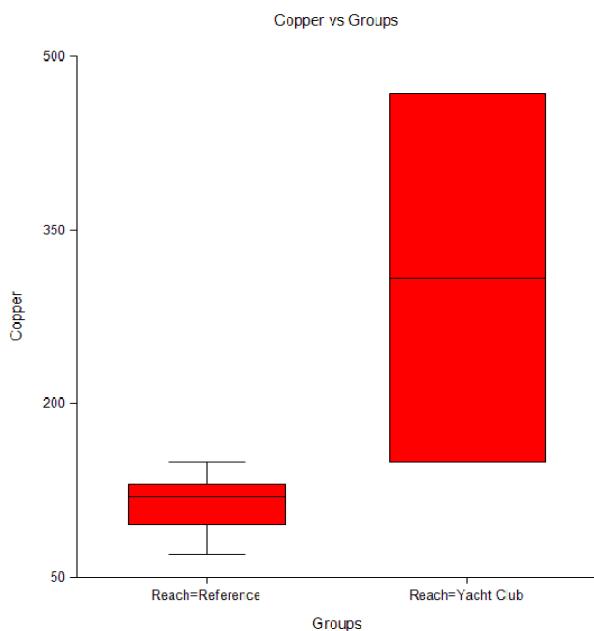
Kolmogorov-Smirnov Test For Different Distributions

Alternative Hypothesis	Dmn Criterion	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.875000	0.8912	0.050	No	0.1333
D(1)<D(2)	0.875000	0.8912	0.025	No	
D(1)>D(2)	0.000000	0.8912	0.025	No	

Plots Section

Dataset
Variable

Two-Sample Test Report
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Copper



Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Site	12	295.75	354.3707	102.298	70.59362	520.9064
Reach=Yacht Club	2	308.75	224.5064	158.75	-1708.36	2325.86

Note: T-alpha (Reach=Site) = 2.2010, T-alpha (Reach=Yacht Club) = 12.7062

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	12	-13	345.4185	263.8177	-587.8095	561.8095
Unequal	1.97	-13	419.5017	188.8556	-836.7322	810.7322

Note: T-alpha (Equal) = 2.1788, T-alpha (Unequal) = 4.3617

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-0.0493	0.961510	No	0.050237	0.010069
Difference < 0	-0.0493	0.480755	No	0.054991	0.011238
Difference > 0	-0.0493	0.519245	No	0.045377	0.008882

Difference: (Reach=Site)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-0.0688	0.951462	No	0.050217	0.010046
Difference < 0	-0.0688	0.475731	No	0.055402	0.011128
Difference > 0	-0.0688	0.524269	No	0.044999	0.008962

Difference: (Reach=Site)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Site)	3.1592	0.001582	Reject normality
Kurtosis Normality (Reach=Site)	2.3038	0.021231	Reject normality
Omnibus Normality (Reach=Site)	15.2885	0.000479	Reject normality
Skewness Normality (Reach=Yacht Club)	0.0000		
Kurtosis Normality (Reach=Yacht Club)		1.000000	Cannot reject normality
Omnibus Normality (Reach=Yacht Club)			
Variance-Ratio Equal-Variance Test	2.4915	0.921334	Cannot reject equal variances
Modified-Levene Equal-Variance Test	0.0000	0.000000	

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Site	12	150.5	129	202
Reach=Yacht Club	2	308.75		

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Copper

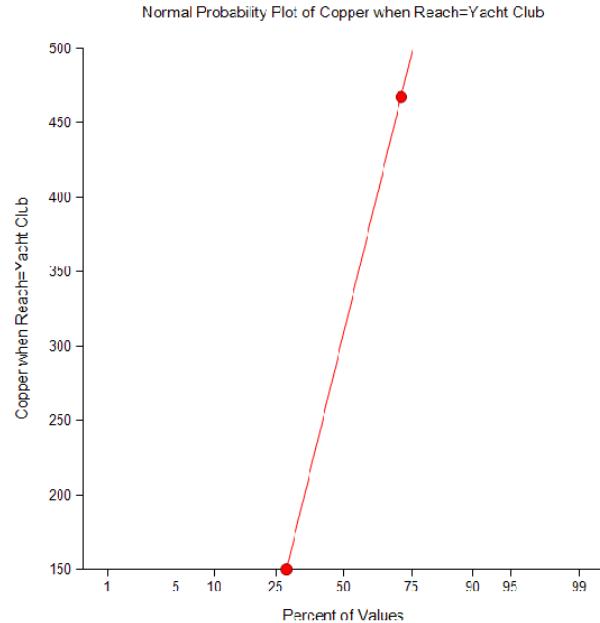
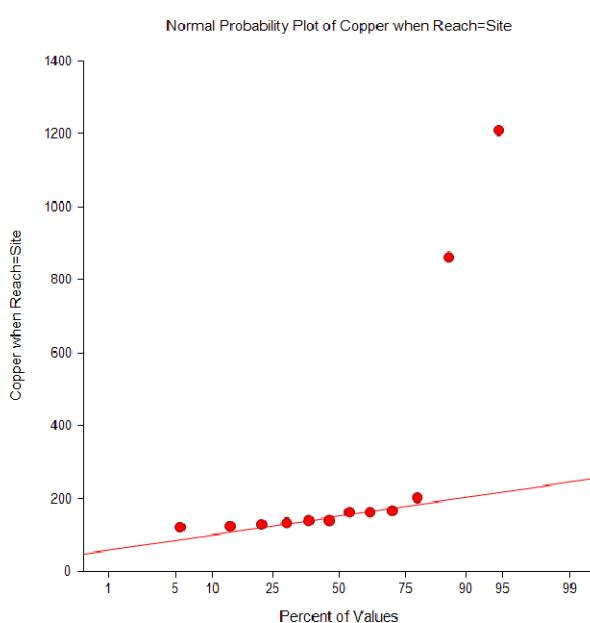
Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Site	8	86	90	5.465175
Reach=Yacht Club	16	19	15	5.465175
Number Sets of Ties = 2, Multiplicity Factor = 12				

Alternative Hypothesis	Exact Probability		Approx. Without Correction		Approx. With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level
Diff<>0			0.7319	0.464225	No	0.6404	0.521900
Diff<0			0.7319	0.232113	No	0.6404	0.260950
Diff>0			0.7319	0.767887	No	0.8234	0.794858

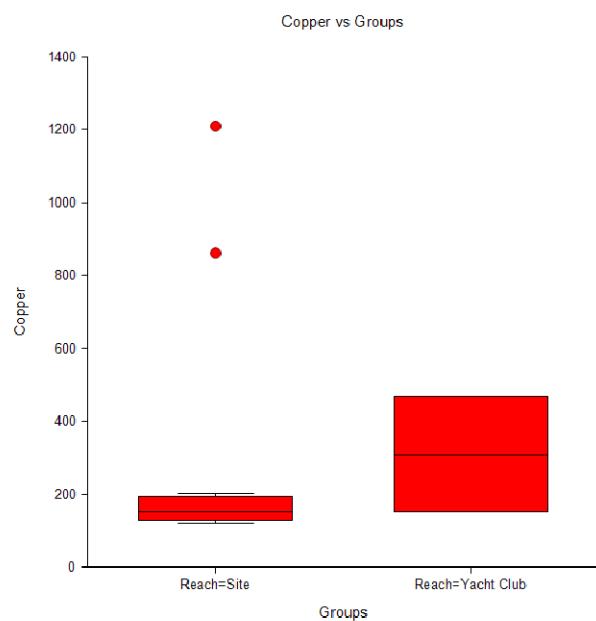
Kolmogorov-Smirnov Test For Different Distributions

Alternative Hypothesis	Dmn Criterion Value	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.500000	0.8790	0.050	No	0.7253
D(1)<D(2)	0.500000	0.8790	0.025	No	
D(1)>D(2)	0.166667	0.8790	0.025	No	

Plots Section

Dataset
Variable

Two-Sample Test Report
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Copper



Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Lead

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Reference	8	223	60.44833	21.37171	172.4639	273.5361
Reach=Site	12	332.25	102.0874	29.4701	267.3867	397.1133

Note: T-alpha (Reach=Reference) = 2.3646, T-alpha (Reach=Site) = 2.2010

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	18	-109.25	88.26043	40.28519	-193.886	-24.61396
Unequal	17.85	-109.25	118.6416	36.4038	-185.7767	-32.72329

Note: T-alpha (Equal) = 2.1009, T-alpha (Unequal) = 2.1022

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-2.7119	0.014285	Yes	0.727451	0.455311
Difference < 0	-2.7119	0.007143	Yes	0.832212	0.571823
Difference > 0	-2.7119	0.992857	No	0.000010	0.000001

Difference: (Reach=Reference)-(Reach=Site)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-3.0011	0.007719	Yes	0.809608	0.558241
Difference < 0	-3.0011	0.003859	Yes	0.892425	0.671919
Difference > 0	-3.0011	0.996141	No	0.000003	0.000000

Difference: (Reach=Reference)-(Reach=Site)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Reference)	0.4805	0.630839	Cannot reject normality
Kurtosis Normality (Reach=Reference)	0.6702	0.502730	Cannot reject normality
Omnibus Normality (Reach=Reference)	0.6801	0.711737	Cannot reject normality
Skewness Normality (Reach=Site)	3.2876	0.001010	Reject normality
Kurtosis Normality (Reach=Site)	2.9423	0.003257	Reject normality
Omnibus Normality (Reach=Site)	19.4659	0.000059	Reject normality
Variance-Ratio Equal-Variance Test	2.8522	0.174469	Cannot reject equal variances
Modified-Levene Equal-Variance Test	0.1681	0.686605	Cannot reject equal variances

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Reference	8	224	132	253
Reach=Site	12	302.5	264	387

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Lead

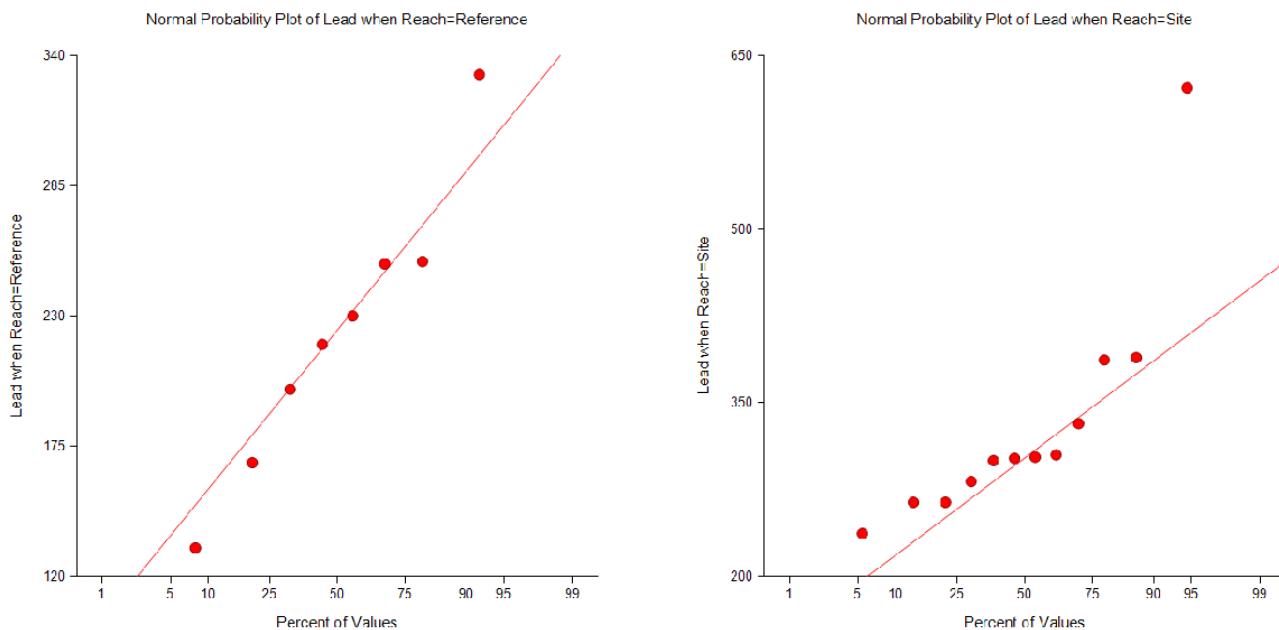
Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

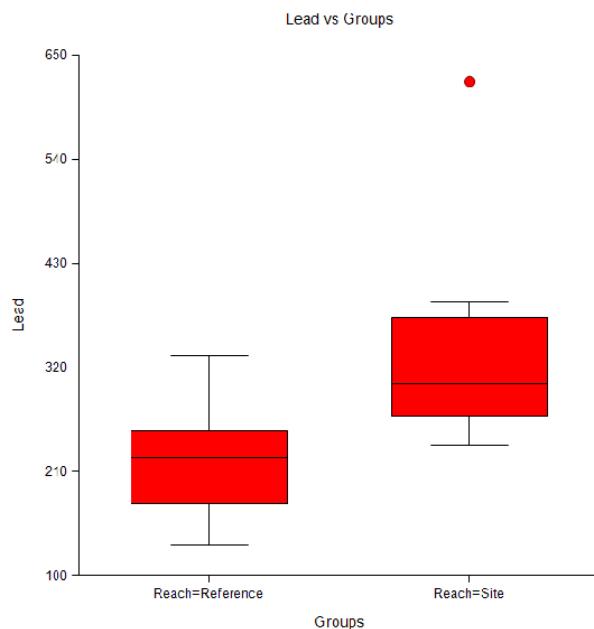
Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Reference	10.5	46.5	84	12.95173
Reach=Site	85.5	163.5	126	12.95173
Number Sets of Ties = 2, Multiplicity Factor = 12				

Alternative Hypothesis	Exact Probability		Approx. Without Correction		Approx. With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level
Diff<>0			-2.8954	0.003787	Yes	-2.8568	0.004280
Diff<0			-2.8954	0.001894	Yes	-2.8568	0.002140
Diff>0			-2.8954	0.998106	No	-2.9340	0.998327

Kolmogorov-Smirnov Test For Different Distributions

Alternative Hypothesis	Dmn Criterion Value	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.791667	0.5726	0.050	Yes	0.0020
D(1)<D(2)	0.791667	0.5726	0.025	Yes	
D(1)>D(2)	0.000000	0.5726	0.025	No	

Plots Section

Two-Sample Test ReportDataset
Variable...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Lead

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Lead

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Reference	8	223	60.44833	21.37171	172.4639	273.5361
Reach=Yacht Club	2	515	400.2224	283	-3080.856	4110.856

Note: T-alpha (Reach=Reference) = 2.3646, T-alpha (Reach=Yacht Club) = 12.7062

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	8	-292	152.3795	120.4665	-569.7963	-14.20366
Unequal	1.01	-292	404.7617	283.8058	-3803.174	3219.174

Note: T-alpha (Equal) = 2.3060, T-alpha (Unequal) = 12.3717

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-2.4239	0.041596	Yes	0.567273	0.263719
Difference < 0	-2.4239	0.020798	Yes	0.714767	0.380392
Difference > 0	-2.4239	0.979202	No	0.000050	0.000005

Difference: (Reach=Reference)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-1.0289	0.489404	No	0.074520	0.014930
Difference < 0	-1.0289	0.244702	No	0.138364	0.027886
Difference > 0	-1.0289	0.755298	No	0.009878	0.001968

Difference: (Reach=Reference)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Reference)	0.4805	0.630839	Cannot reject normality
Kurtosis Normality (Reach=Reference)	0.6702	0.502730	Cannot reject normality
Omnibus Normality (Reach=Reference)	0.6801	0.711737	Cannot reject normality
Skewness Normality (Reach=Yacht Club)	0.0000		
Kurtosis Normality (Reach=Yacht Club)		1.000000	Cannot reject normality
Omnibus Normality (Reach=Yacht Club)			
Variance-Ratio Equal-Variance Test	43.8363	0.000597	Reject equal variances
Modified-Levene Equal-Variance Test	0.0000	0.000000	

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Reference	8	224	132	253
Reach=Yacht Club	2	515		

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 Variable Lead

Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

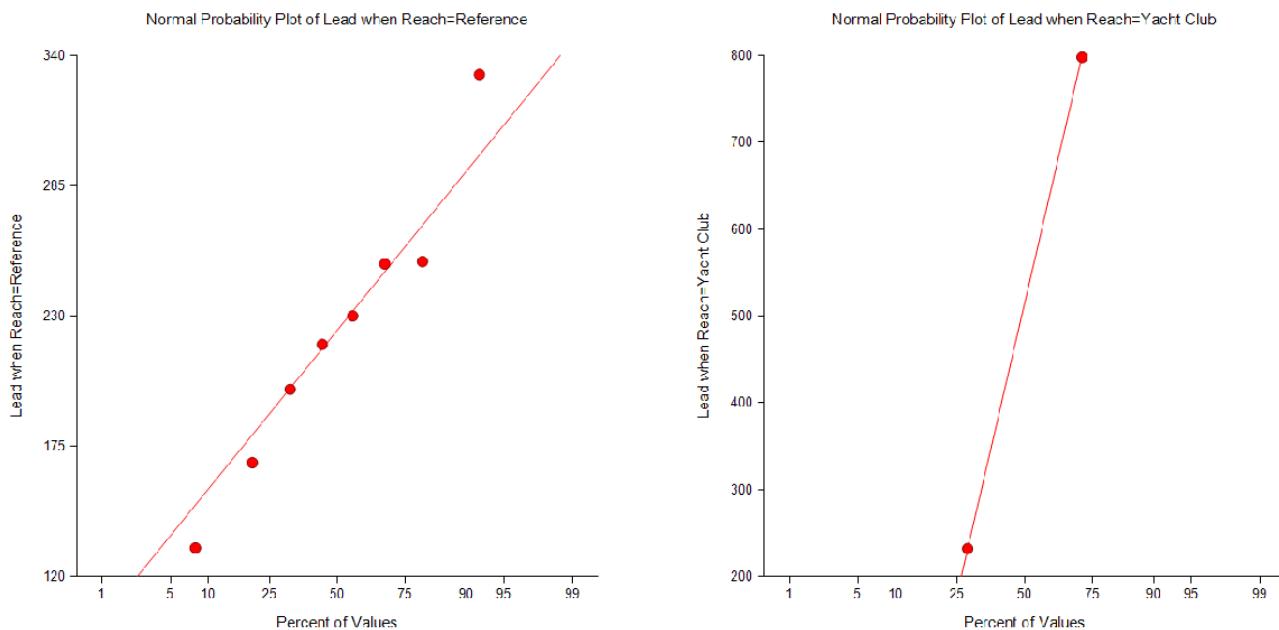
Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Reference	3	39	44	3.829708
Reach=Yacht Club	13	16	11	3.829708
Number Sets of Ties = 0, Multiplicity Factor = 0				

Alternative Hypothesis	Exact Probability		Approx. Without Correction		Approx. With Correction			
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level	
Diff<>0	0.266667	No	1.3056	0.191695	No	1.1750	0.239985	No
Diff<0	0.133333	No	1.3056	0.095847	No	1.1750	0.119993	No
Diff>0	0.866667	No	1.3056	0.904153	No	1.4361	0.924519	No

Kolmogorov-Smirnov Test For Different Distributions

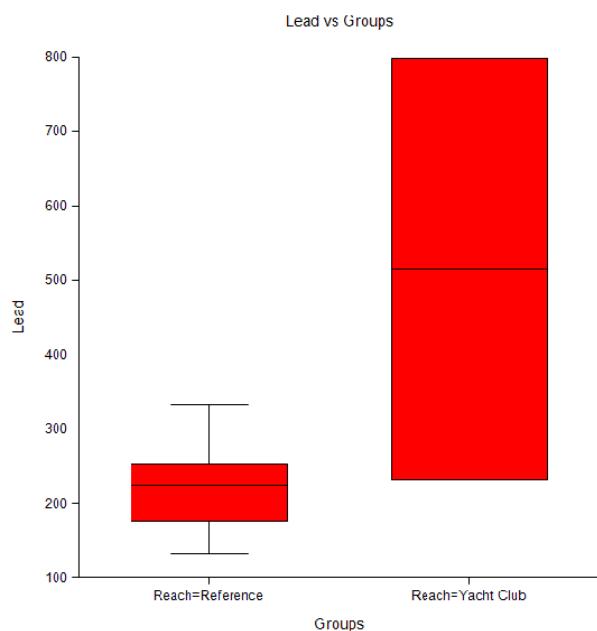
Alternative Hypothesis	Dmn Criterion Value	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.625000	0.8912	0.050	No	0.4444
D(1)<D(2)	0.625000	0.8912	0.025	No	
D(1)>D(2)	0.000000	0.8912	0.025	No	

Plots Section



Dataset
Variable

Two-Sample Test Report
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Lead



Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Lead

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
Reach=Site	12	332.25	102.0874	29.4701	267.3867	397.1133
Reach=Yacht Club	2	515	400.2224	283	-3080.856	4110.856

Note: T-alpha (Reach=Site) = 2.2010, T-alpha (Reach=Yacht Club) = 12.7062

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	12	-182.75	151.3325	115.5821	-434.5818	69.08175
Unequal	1.02	-182.75	413.0373	284.5303	-3620.818	3255.318

Note: T-alpha (Equal) = 2.1788, T-alpha (Unequal) = 12.0833

Equal-Variance T-Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-1.5811	0.139834	No	0.307344	0.114550
Difference < 0	-1.5811	0.069917	No	0.439048	0.179289
Difference > 0	-1.5811	0.930083	No	0.000838	0.000088

Difference: (Reach=Site)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Aspin-Welch Unequal-Variance Test Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.050)	Power (Alpha=.010)
Difference <> 0	-0.6423	0.634671	No	0.060145	0.012039
Difference < 0	-0.6423	0.317335	No	0.100310	0.020151
Difference > 0	-0.6423	0.682665	No	0.019681	0.003925

Difference: (Reach=Site)-(Reach=Yacht Club)

The randomization test results are based on 1000 Monte Carlo samples.

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality (Reach=Site)	3.2876	0.001010	Reject normality
Kurtosis Normality (Reach=Site)	2.9423	0.003257	Reject normality
Omnibus Normality (Reach=Site)	19.4659	0.000059	Reject normality
Skewness Normality (Reach=Yacht Club)	0.0000		
Kurtosis Normality (Reach=Yacht Club)		1.000000	Cannot reject normality
Omnibus Normality (Reach=Yacht Club)			
Variance-Ratio Equal-Variance Test	15.3695	0.004782	Reject equal variances
Modified-Levene Equal-Variance Test	0.0000	0.000000	

Median Statistics

Variable	Count	Median	95.0% LCL of Median	95.0% UCL of Median
Reach=Site	12	302.5	264	387
Reach=Yacht Club	2	515		

Two-Sample Test Report

Dataset ...\\Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
 Variable Lead

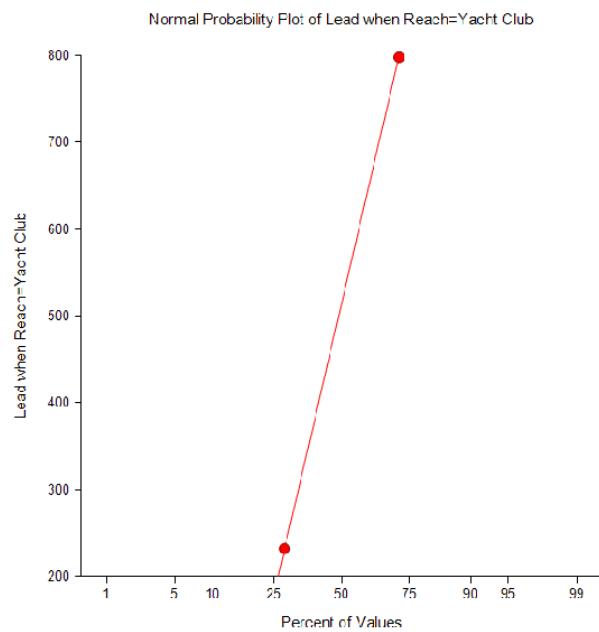
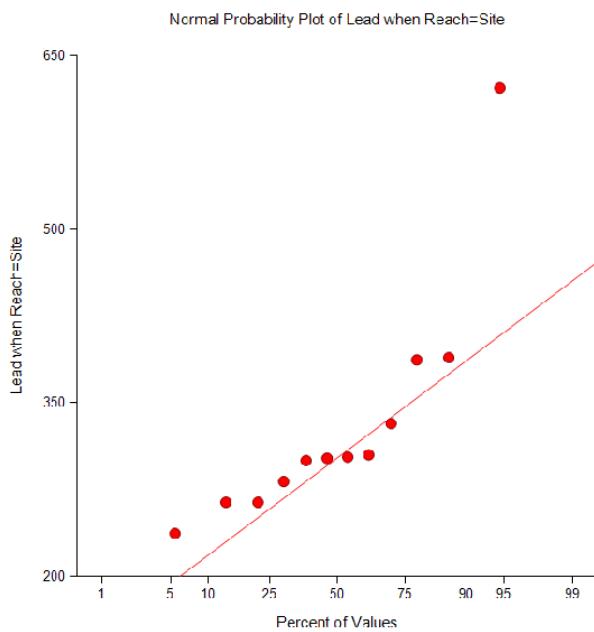
Mann-Whitney U or Wilcoxon Rank-Sum Test for Difference in Medians

Variable	Mann Whitney U	W Sum Ranks	Mean of W	Std Dev of W
Reach=Site	12	90	90	5.471203
Reach=Yacht Club	12	15	15	5.471203
Number Sets of Ties = 1, Multiplicity Factor = 6				

Alternative Hypothesis	Exact Probability		Approx. Without Correction		Approx. With Correction		
	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value	Prob Level
Diff<>0			0.0000	1.000000	No	0.0914	1.000000
Diff<0			0.0000	0.500000	No	-0.0914	0.536408
Diff>0			0.0000	0.500000	No	0.0914	0.536408

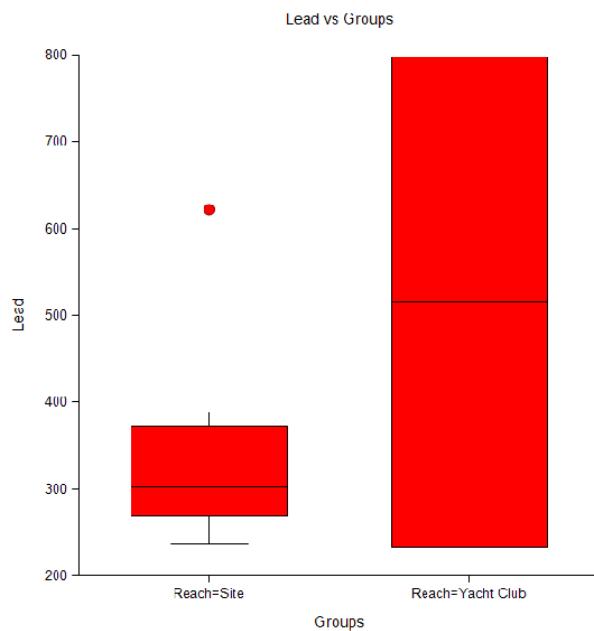
Kolmogorov-Smirnov Test For Different Distributions

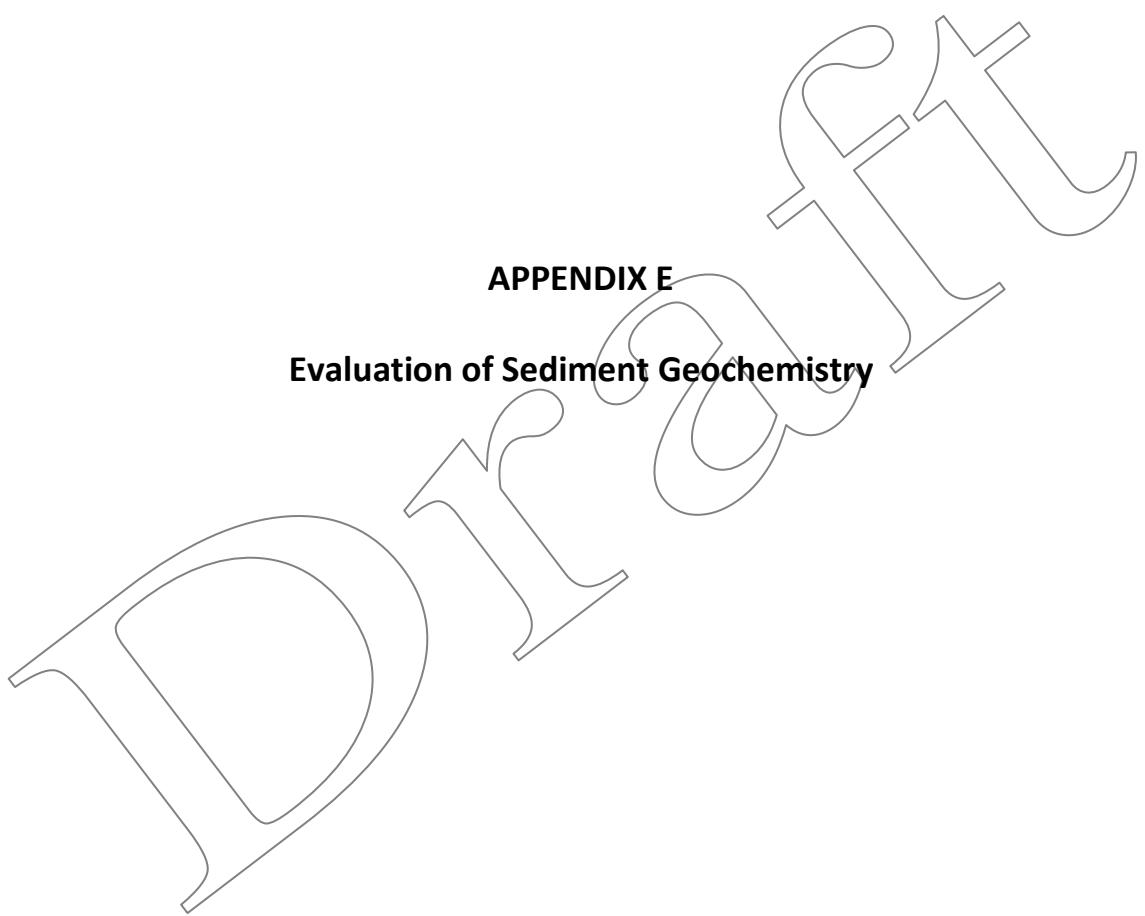
Alternative Hypothesis	Dmn Criterion	Reject H0 if Greater Than	Test Alpha Level	Reject H0 (Test Alpha)	Prob Level
D(1)<>D(2)	0.500000	0.8790	0.050	No	0.7253
D(1)<D(2)	0.500000	0.8790	0.025	No	
D(1)>D(2)	0.500000	0.8790	0.025	No	

Plots Section

Dataset
Variable

Two-Sample Test Report
...Copy of 2017-1127-BeverlyUSM Table I SedQualityData-D2.NCSS
Lead





APPENDIX E

Evaluation of Sediment Geochemistry

TABLE E1**DATA TABULATION FOR SEDIMENT GEOCHEMISTRY AND STATISTICAL ANALYSIS**

FORMER USM SOUTH PARCEL

BEVERLY, MASSACHUSETTS

FILE NO. 37713-002

Depth	Reach	Sample_ID	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
A	Yacht Club	B-S1-A	34.8	71.0	0.4	343.0	467.5	798.0	1.7	292.5		480.5
B	Yacht Club	B-S1-B	18.8	112.0	1.4	538.0	150.0	232.0	0.8	39.6		271.0
A	Site	S5-A	27.3	46.4		144.0	202.0	622.0	0.3	47.0		315.0
B	Site	S5-B	25.5	88.8	2.5	996.0	139.0	282.0	1.4	31.5	2.5	295.0
A	Site	S4-A	18.0	46.4	0.6	207.0	862.0	387.0	0.4	39.2	0.8	288.5
B	Site	S4-B	28.2	107.0	2.6	1190.0	162.0	332.0	2.0	38.8	3.6	341.0
C	Site	S4-C	35.8	98.0	2.6	1120.0	1210.0	389.0	1.7	41.7	4.0	310.0
A	Site	S3-A	27.2	47.5	0.8	386.0	162.0	305.0	0.6	34.2	1.2	337.0
B	Site	S3-B	30.9	106.0	3.0	1110.0	133.0	300.0	1.9	32.7	3.2	336.0
C	Site	S3-C	29.2	108.0	2.7	1120.0	139.0	303.0	1.7	34.3	3.8	324.0
A	Site	S2-A	39.5	35.9	0.5	247.0	166.0	264.0	0.4	27.3	0.9	265.0
B	Site	S2-B	27.5	83.0	2.3	860.0	124.0	302.0	1.5	33.6	2.8	327.0
A	Site	S1-A	24.2	77.3	1.8	801.0	129.0	264.0	1.1	34.7	3.3	290.0
B	Site	S1-B	36.1	72.8	1.4	637.0	121.0	237.0	2.3	27.4	2.0	338.0
A	Reference	R1-A	18.9	66.4	1.4	685.0	101.0	168.0	1.0	23.7	1.5	236.0
B	Reference	R1-B	22.5	74.2	1.7	836.0	133.0	230.0	1.0	30.7	2.1	295.0
A	Reference	R2-A	23.1	47.2	0.8	362.0	70.2	132.0	1.6	20.9	0.8	189.0
B	Reference	R2-B	32.0	78.9	1.7	700.0	93.6	218.0	1.7	28.9	1.7	249.0
A	Reference	R3-A	24.2	87.3	2.2	1010.0	119.0	253.0	1.4	29.3	2.2	356.0
B	Reference	R3-B	19.0	69.7	2.0	821.0	120.0	199.0	1.2	24.7	2.0	251.0
A	Reference	R4-A	24.0	102.0	2.2	976.0	120.0	252.0	1.7	30.8	2.3	287.0
B	Reference	R4-B	26.7	105.0	2.6	1280.0	150.0	332.0	1.9	36.3	3.0	349.0

NOTE: Blanks cells were values that were below the analytical limit of detection. Selenium was not included as it was not detected in samples from either the Site Area nor the Bass River Yacht Club.

TABLE E2

PEARSON'S CORRELATION MATRIX FOR METALS IN SEDIMENT

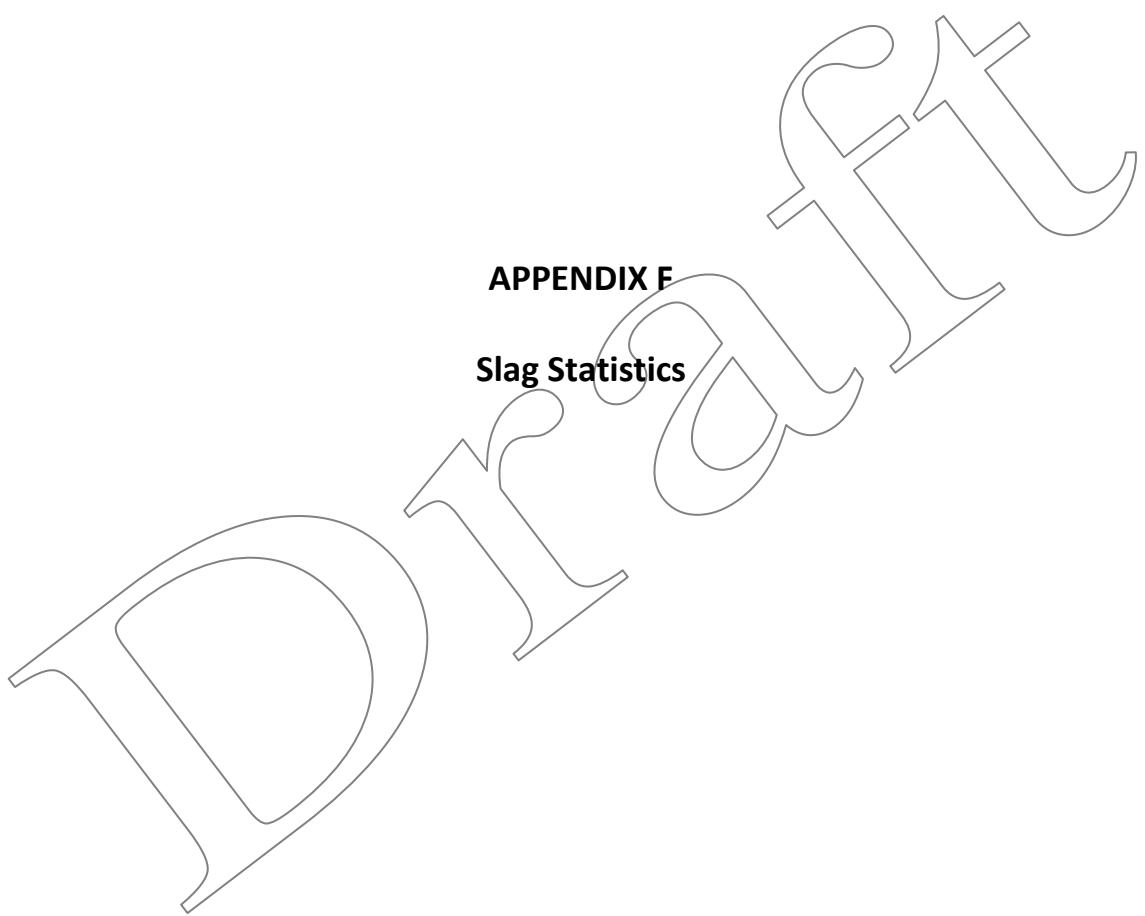
FORMER USM SOUTH PARCEL

BEVERLY, MASSACHUSETTS

FILE NO. 37713-002

	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc
Arsenic	1.00									
Barium	-0.02	1.00								
Cadmium	0.00	0.82	1.00							
Chromium	0.02	0.84	0.97	1.00						
Copper	0.18	-0.04	-0.09	-0.07	1.00					
Lead	0.34	-0.10	-0.20	-0.29	0.41	1.00				
Mercury	0.34	0.65	0.59	0.68	-0.08	-0.10	1.00			
Nickel	0.29	-0.05	-0.37	-0.26	0.24	0.80	0.11	1.00		
Silver	0.25	0.88	0.89	0.88	0.17	0.47	0.60	0.59	1.00	
Zinc	0.42	0.25	0.07	0.14	0.19	0.75	0.28	0.72	0.55	1.00

NOTE: Highlighted values have correlation coefficients that are greater than 0.6 (shaded) or less than -0.6 (bolded). Correlations are for screening purposes only and R^2 greater than 0.6 or less than -0.6 does not necessarily mean there is a significant relationship between the two metals.



APPENDIX F

Slag Statistics

TABLE III
SUMMARY OF SLAG DATA STATISTICS
USM SOUTH PARCEL
BEVERLY, MASSACHUSETTS
FILE NO. 37713-030

COMPOUND	FREQUENCY OF DETECTION			MINIMUM DETECTED LEVEL (mg/kg)	AVERAGE LEVEL (mg/kg)	MAXIMUM DETECTED LEVEL (mg/kg)	SAMPLE WITH MAXIMUM LEVEL
MCP Total Metals (mg/kg)							
Arsenic, Total	6	/	7	0.92	17	56	HA4-SL-01-030512-1136
Barium, Total	7	/	7	1.0	22	42	HA3-SL-01-030512-1110
Chromium, Total	7	/	7	2.6	40	75	HA3-SL-01-030512-1110
Copper, Total	7	/	7	5.6	184	430	HA3-SL-01-030512-1110
Lead, Total	7	/	7	13	84	360	HA2-SL-02-030512-1020
Mercury, Total	3	/	7	0.13	1.2	4.8	HA1-SL-01-030512-0940
Nickel, Total	7	/	7	2.7	36	61	HA2-SL-01-030512-1015
Zinc, Total	7	/	7	7.2	192	600	HA2-SL-01-030512-1015
MCP Semivolatile Organics (mg/kg)							
2-Methylnaphthalene	4	/	7	0.013	0.23	0.056	HA2-SL-01-030512-1015
Acenaphthene	3	/	7	0.016	0.23	0.079	HA3-SL-02-030512-1115
Anthracene	3	/	7	0.22	0.96	6.1	HA3-SL-01-030512-1110
Benzo(a)anthracene	6	/	7	0.027	16	110	HA3-SL-01-030512-1110
Benzo(a)pyrene	5	/	7	0.021	18	120	HA3-SL-01-030512-1110
Benzo(b)fluoranthene	7	/	7	0.013	19	130	HA3-SL-01-030512-1110
Benzo(ghi)perylene	6	/	7	0.021	12	78	HA3-SL-01-030512-1110
Benzo(k)fluoranthene	6	/	7	0.019	15	99	HA3-SL-01-030512-1110
Chrysene	7	/	7	0.019	15	100	HA3-SL-01-030512-1110
Dibeno(a,h)anthracene	3	/	7	0.20	3.5	23	HA3-SL-01-030512-1110
Fluoranthene	7	/	7	0.037	18	120	HA3-SL-01-030512-1110
Fluorene	2	/	7	0.014	0.22	0.056	HA2-SL-01-030512-1015
Indeno(1,2,3-cd)Pyrene	5	/	7	0.018	12	81	HA3-SL-01-030512-1110
Naphthalene	6	/	7	0.016	0.35	0.86	HA4-SL-01-030512-1136
Phenanthrene	7	/	7	0.044	5.5	36	HA3-SL-01-030512-1110
Pyrene	7	/	7	0.028	15	100	HA3-SL-01-030512-1110

NOTES:

1. Only compounds detected above laboratory detection limits at least once are listed.
2. This table summarizes the results for samples coded as "SL" in Table I.